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Innovative Treatment Technologies: Annual Status Report

(Sixth Edition)

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INNOVATIVE TREATMENT TECHNOLOGIES: ANNUAL STATUS REPORT (Sixth Edition)

U.S. Environmental Protection Agency
Office of Solid Waste and Emergency Response
Technology Innovation Office
Washington, DC 20460

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September 1994

INNOVATIVE TREATMENT TECHNOLOGIES: ANNUAL STATUS REPORT

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FOREWORD

In April 1990, the U.S. Environmental Protection Agency's (EPA) Office of Solid Waste and Emergency Response (OSWER) established the Technology Innovative Office (TIO) to promote the use of innovative treatment technologies for contaminated site cleanup. TIO's mission is to encourage government and industry to increase the use of innovative treatment technology to mitigate contaminated waste sites, soils and ground water. One of TIO's goals is the removal of regulatory and institutional barriers to the development and use of innovative technologies. Another is the provision of richer technology and market information to target audiences, including federal agencies, states, consulting engineering firms, responsible parties, technology developers, technology vendors and the investment community.

This report documents the status of innovative treatment technology use in the Superfund program. To a lesser extent, the report presents information on innovative treatment projects at non-Superfund sites under the jurisdiction of the Department of Defense and the Department of Energy. We have expanded the report to include many new innovative projects selected by EPA in fiscal year 1993 and numerous graphics and tables to assist the reader in understanding the data. We hope that this information will allow better communication between experienced technology users and those who are considering innovative technologies to clean up contaminated sites, as well as enabling technology vendors to evaluate the market for innovative treatment technologies in Superfund for the next several years.

The use of innovative treatment technologies in Superfund and other EPA waste programs is addressed by a directive, *Furthering the Use of Innovative Treatment Technologies in OSWER Programs* (OSWER Directive 9380.0-17, June 10, 1991). This directive sets forth seven initiatives to remove impediments from and create incentives for the use of innovative treatment technologies for Superfund, corrective action under the Resource Conservation and Recovery Act (RCRA), and underground storage tank cleanups. It is hoped that efforts such as the directive and this document will increase the reliance on new, less costly, or more effective technologies to address the problems associated with Superfund and other hazardous waste sites, and petroleum contamination.

Walter W. Kovalick, Jr. Ph.D.
Director, Technology Innovation Office

ACKNOWLEDGEMENTS

This document was prepared under the direction of Ms. Linda Fiedler, work assignment manager for the U.S. Environmental Protection Agency's Technology Innovation Office.

Special acknowledgement is due the Regional and state staff listed as contacts for individual sites. They provided the detailed information in this document. Their cooperation and willingness to share their knowledge and expertise on innovative treatment technologies encourages the application of those technologies at other sites.

ABSTRACT

This yearly report (formerly published twice a year) documents and analyzes the selection and use of innovative treatment technologies in the U.S. EPA Superfund Program and at some non-Superfund sites under the jurisdiction of the Departments of Defense (DoD) and Energy (DOE). The status of most projects have been updated, and projects selected in fiscal year 1993 Superfund Records of Decision (ROD) are included. The information will allow better communication between experienced technology users and those who are considering innovative technologies to clean up contaminated sites. In addition, the information will enable technology vendors to evaluate the market for innovative technologies in Superfund for the next several years. It also will be used by EPA's Technology Innovation Office to track progress in the application of innovative treatment technologies.

Alternative treatment technologies are alternatives to land disposal. Innovative treatment technologies are alternative treatment technologies the use of which at Superfund and similar sites is inhibited by lack of data on cost and performance. This report documents the use of the following innovative treatment technologies to treat ground water (in situ), soils, sediments, sludge, and solid-matrix wastes:

- Bioremediation (Ex Situ)
- Bioremediation (In Situ)
- Chemical treatment
- Dechlorination
- In situ flushing
- In situ vitrification
- Soil vapor extraction
- Soil washing
- Solvent extraction
- Thermal desorption
- Other technologies (air sparging, contained recovery of oil wastes, limestone barriers and fuming gasification)

The document includes information on 290 applications of innovative treatment technologies for remedial actions, 31 applications for removal actions, and 28 applications under other federal programs. Sections 1, 2, and 3 contain summary information for Superfund remedial, removal and other Federal program sites, at which innovative treatment has been selected or used. Appendices A, B, and C contain site-specific information for Superfund remedial, removal and other federal program sites respectively. The information for these sections was collected through analyses of RODs, review of OSWER tracking systems, and interviews with EPA regional, DoD, and DOE staff. Appendix E also contains performance and operating data on the 25 remedial, 20 removal, and 7 non-Superfund innovative projects that have been completed.

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Apendices

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LIST OF ABREVIATIONS

AM	Action Memorandum
APC	Air pollution control
APEG	Alkaline metal hydroxide/polyethylene glycol
ARCS	Alternative remedial contracts strategy
ATTIC	Alternative Treatment Technology Information Center
BCD	Base catalyzed dechlorination
BTEX	Benzene, toluene, ethylbenzene, and xylene
BTX	Benzene, toluene, and xylene
cy	Cubic yards
DCA	Dichloroethane
DCE	Dichloroethylene
DEHP	Di(2-ethylhexyl phthalate)
DLA	Defense Logistics Agency
DNT	Dinitrotoluene
EECA	Engineering Evaluation/Cost Analysis
ESD	Explanation of significant differences
FAA	Federal Aviation Administration
ft	Feet
FUDS	Formerly used defense sites
FY	Fiscal year
gw	Ground water
IRP	Installation Restoration Program
KPEG	Potassium hydroxide/polyethylene glycol
MEK	Methyl ethyl ketone
MBOCA	4,4' -Methylenebis(2-chloroaniline)
NAPL	Nonaqueous phase liquids
NFEC	Navy Facilities Engineering Command
NPL	National Priorities List
OERR	Office of Emergency and Remedial Response
OSC	On-scene coordinator
OSWER	Office of Solid Waste and Emergency Response
OU	Operable unit
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCE	Perchloroethylene (tetrachloroethylene)
PCP	Pentachlorophenol
PRP	Potentially responsible party
RA	Remedial action
RCRA	Resource Conservation and Recovery Act
RD	Remedial design
ROD	Record of Decision
RPM	Remedial project manager
RSKERL	Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma (EPA)
SARA	Superfund Amendment and Reauthorization Act of 1986
SACM	Superfund Accelerated Cleanup Model
SVOC	Semivolatile organic compound
S/S	Solidification and stabilization
TCA	Trichloroethane
TCE	Trichloroethylene
TIO	Technology Innovation Office
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
VOC	Volatile organic compound

OVERVIEW

Introduction

The Technology Innovation Office (TIO) of the U.S. Environmental Protection Agency's (EPA) Office of Solid Waste and Emergency Response (OSWER) has prepared this *Innovative Treatment Technologies: Annual Status Report* to document the use of innovative treatment technologies to remediate both Superfund and non-Superfund sites. The report contains site-specific information on Superfund sites (both remedial and removal actions) and non-Superfund sites (sites addressed under other federal programs) at which innovative treatment technologies are being used. Site managers can use this report in evaluating cleanup alternatives. Innovative technology vendors can use it in identifying potential markets. TIO also uses the information to track progress in the application of innovative treatment technologies.

The report is updated annually. This September 1994 issue of the report updates and expands information provided in the September 1993 report. Information added to this update includes 60 innovative treatment technologies selected for remedial actions in fiscal year (FY) 1993 Superfund records of decision (ROD)—a ROD is the decision document used to specify the way a site, or part of a site, will be remediated—and information on 11 additional completed projects.

What Are Alternative and Innovative Treatment Technologies?

Alternative treatment technologies are alternatives to land disposal. The most frequently used alternative technologies are incineration and solidification/stabilization. Innovative treatment technologies are alternative treatment technologies for which applications at Superfund and similar sites are inhibited by lack of data on performance and cost. In general, a treatment technology is considered innovative if it has had limited full-scale application. Often, it is the application of a technology or process to soils, sediments, sludge, and solid-matrix waste (such as mining slag) that is innovative. Groundwater treatment after the water has been pumped to the surface often resembles traditional water treatment technologies; thus, in general, pump-and-treat or ex situ groundwater remedies are considered established. In situ bioremediation and other in situ treatment of groundwater, however, are considered innovative technologies.

This report documents the use of the following innovative treatment technologies to treat soils, sediments, sludge, and solid-matrix waste:

- Bioremediation (Ex Situ)
- Bioremediation (In Situ)
- Chemical treatment
- Dechlorination
- In situ flushing
- In situ vitrification
- Soil vapor extraction
- Soil washing
- Solvent extraction
- Thermal desorption
- Other technologies (e.g., air sparging, contained recovery of oily wastes, limestone barriers, and fuming gasification)

In addition, the remedial sites that are using in-situ bioremediation for groundwater remediation are included with the in situ bioremediation projects.

Sources of Information for This Report

EPA initially used RODs from individual sites to compile information on remedial actions and pollution reports, on-scene coordinators' reports, and the OSWER Removal Tracking System to compile data on emergency response actions. The U.S. Army Corps of Engineers Hazardous, Toxic, Radioactive Waste (HTRW) Mandatory Center of Expertise (Omaha, Nebraska) and the *Synopses of Federal*

Demonstrations of Innovative Site Remediation Technologies, Third Edition (EPA/542/B-93/009) were consulted to compile information on projects under other federal programs. EPA then verified and updated the draft information through interviews with remedial project managers (RPM) and on-scene coordinators (OSC) and other contacts for each site. The data concerning project status do not duplicate data in CERCLIS, EPA's Superfund tracking system. This report provides more detailed information specifically on the portion of the remedy pertaining to an innovative technology. In addition, information about technologies and sites identified here might differ from information found in the ROD annual reports and the RODs database. These differences are the result of design changes in the treatment trains used at sites that may or may not require official documentation (that is, a ROD amendment or an explanation of significant differences (ESD)).

Definitions of Specific Innovative Treatment Technologies

The innovative treatment technologies reported in the following chapters treat hazardous wastes in very different ways. The following paragraphs define the technologies as they are represented in this document and provide summary statistics on some of the technologies.

EX SITU BIOREMEDIATION uses microorganisms to degrade organic contaminants on excavated soil, sludge, and solids. The microorganisms break down the contaminants by using them as a food source. The end products are typically CO_2 and H_2O. Ex situ bioremediation includes slurry-phase bioremediation, in which the soils are mixed in water to form a slurry, and solid phase bioremediation, in which the soils are placed in a tank or building and tilled with water, and nutrients. Variations of the latter process are called land farming or composting.

In applications of IN SITU BIOREMEDIATION, nutrients and an oxygen source are pumped under pressure into the soil or aquifer through wells, or they are spread on the surface for infiltration to the contaminated material.

In CHEMICAL TREATMENT the contaminants are converted to less hazardous compounds through chemical reactions. The technology is most often used to reduce a contaminant (hexavalent chromium to the trivalent form) or oxidize a contaminant (cyanide, for example). Neutralization is considered an available technology and is not included in this report.

DECHLORINATION (another type of chemical treatment) results in the removal or replacement of chlorine atoms bonded to hazardous compounds.

For IN SITU FLUSHING, large volumes of water, at times supplemented with treatment compounds, are introduced to soil, waste, or groundwater to flush hazardous contaminants from a site. This technology is predicated on the assumption that the injected water can be isolated effectively within the aquifer and recovered.

IN SITU VITRIFICATION treats contaminated soil in place at temperatures of approximately 3000°F (1600°C). Metals are encapsulated in the glass-like structure of the melted silicate compounds. Organics may be treated by combustion.

SOIL WASHING is used for two purposes. First, the mechanical action and water (sometimes with additives) physically remove the contaminants from the soil particles. Second, agitation of the soil particles allows the smaller diameter, more highly contaminated fines to separate from the larger soil particles, thus reducing the volume of material requiring further treatment.

SOLVENT EXTRACTION operates on the principle that organic contaminants can be solubilized preferentially and removed from the

waste in the correct solvent. The solvent used will vary, depending on the waste to be treated.

For THERMAL DESORPTION, the waste is heated in a controlled environment to cause organic compounds to volatilize from the waste. The operating temperature for thermal desorption is usually less than 1000°F (550°C). The volatilized contaminants usually require further control or treatment.

SOIL VAPOR EXTRACTION removes volatile organic constituents from the soil in place through the use of vapor extraction wells, sometimes combined with air injection wells, to strip and flush the contaminants into the air stream for further treatment.

OTHER TECHNOLOGIES include air sparging and the contained recovery of oily wastes (CROW), limestone barriers, and fuming gasification technologies. Air sparging involves injecting air into the aquifer to strip or flush volatile contaminants as the air percolates up through the groundwater and is captured by a vapor extraction system. The CROW process displaces oil wastes with steam and hot water. The contaminated oils and groundwater are swept into a more permeable area and are pumped out of the aquifer. Limestone barriers act like chemical slurry walls. Contaminated groundwater comes into contact with the barrier and pH increases. The increase in pH effectively immobilizes dissolved metals and neutralizes the soil. Fuming gasification is a thermal treatment process that purges contaminants from solids and soils as metal fumes and organic vapors. The organic vapors can be burned as fuel and the metal fumes can be recovered and recycled.

The following sections contain summary information and analysis on sites at which innovative treatment technologies are being or have been applied. Section 1 covers all Superfund sites implementing an innovative treatment technology under a remedial action. These actions are usually documented in a ROD. Section 2 provides information on Superfund removal action sites. Removals are conducted in response to an immediate threat caused by a release of hazardous substances.* Section 3 covers non-Superfund sites or sites being addressed under other federal programs.

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* *Historically, remedial and removal actions operate under different procedural guidelines. The EPA currently is revising the Superfund process under the Superfund Accelerated Cleanup Model (SACM). Under SACM, EPA will adopt a continuous process for assessing site specific conditions and the need for action. Risks will be reduced quickly through early remedial or removal action.*

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SECTION 1: SUPERFUND REMEDIAL ACTIONS

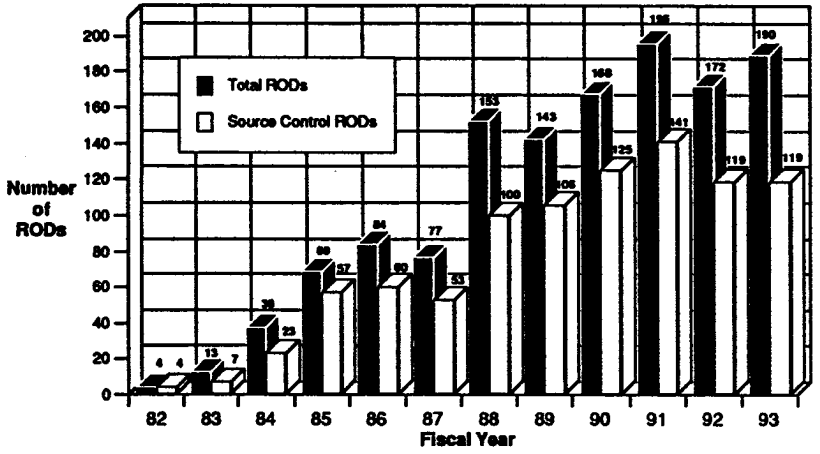
Frequency of Technology Selection

ROD Statistics As of April, 1994, there are 1,287 sites on the National Priorities List (NPL), excluding 58 sites deleted from the NPL. 1,207 RODs (including ROD Amendments) had been signed. Most RODs for remedial actions address the source of contamination, such as soil, sludge, sediments, solid-type wastes, and nonaqueous phase liquids (NAPL). These RODs are referred to as "source control" RODs. Other RODs address ground water only or specify that no action is necessary. Figure 1 shows the number of source control RODs compared with the total number of RODs for each fiscal year.

An analysis of source control RODs allows a comparison of the frequency of selection of treatment with that of selection of containment or disposal to remedy contamination at sites. Source control RODs are classified by the general type of technology selected: (1) RODs specifying some alternative treatment, (2) RODs specifying containment or disposal only, and (3) RODs specifying other action (such as land use restrictions, monitoring, or relocation). Figure 1 shows the number of source control RODs that fall under each category. RODs in which some treatment is selected may include containment of treatment residuals or of waste from another part of the site.

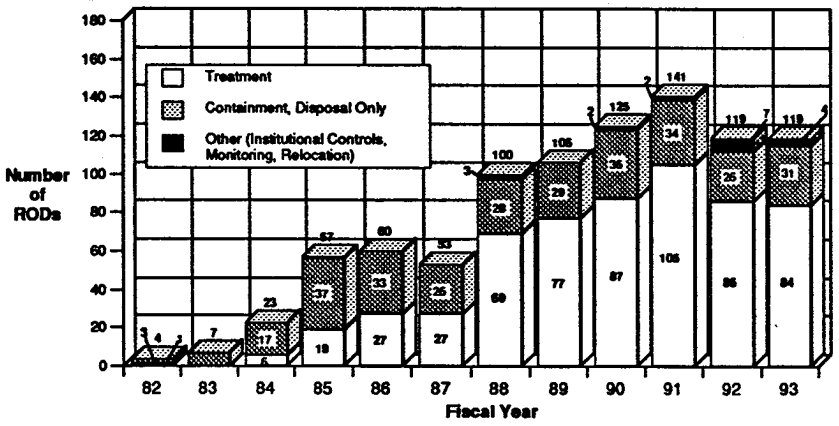
FIGURE 1
***SUPERFUND REMEDIAL ACTIONS:* RODS SIGNED BY FISCAL YEAR**

(Total Number of RODs = 1,117)



The difference between the total number of RODs and the number of source control RODs is the number of "groundwater remedy only" or "no action needed" RODs.
Source: USEPA Office of Emergency and Remedial Response.

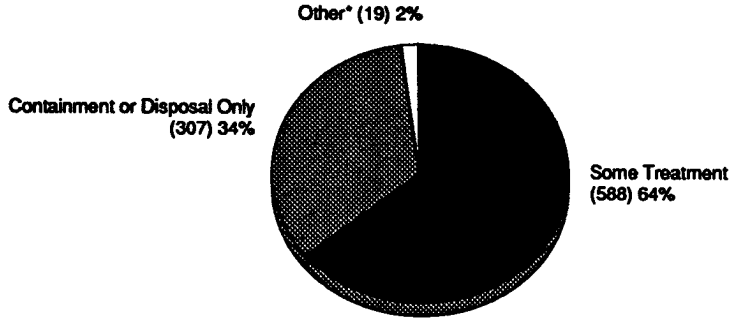
FIGURE 2
***SUPERFUND REMEDIAL ACTIONS:* SOURCE CONTROL RODS BY FISCAL YEAR**



Source: USEPA Office of Emergency and Remedial Response.

Overall, 64 percent of source control RODs have selected at least one treatment technology for source control (Figure 3). The Superfund Amendments and Reauthorization Act of 1986 (SARA) required that EPA favor permanent remedies (that is, alternative treatment) over containment or disposal to remediate Superfund sites. In each of the past six years at least 70 percent of source control RODs contained provisions for the treatment of wastes. The increase is most dramatic

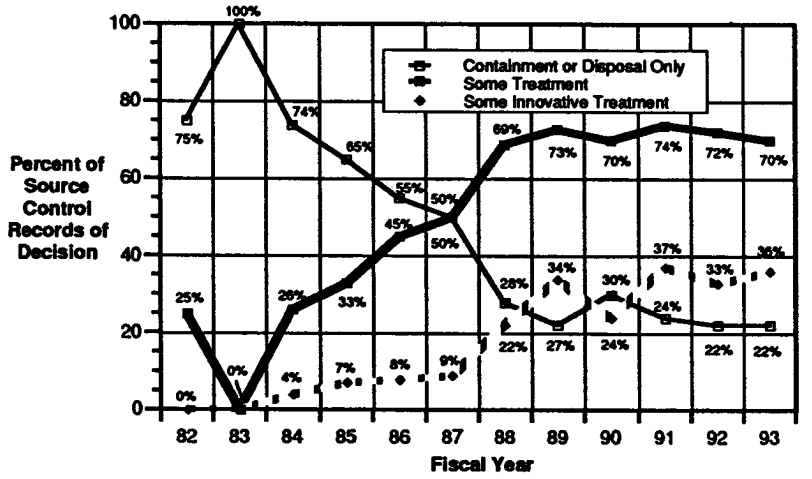
FIGURE 3
***SUPERFUND REMEDIAL ACTIONS:* OVERVIEW OF SOURCE CONTROL RODS THROUGH FISCAL YEAR 1993**



* *Includes institutional controls, monitoring, and relocation.*
( ) Number of RODs
Source: USEPA Office of Emergency and Remedial Response.

in FY1988. Fifty percent of RODs in FY 1987 selected some treatment for source control, whereas 69 percent of RODs in FY 1988 selected some treatment (Figure 4). The percentage was 72 percent in FY 1993. Figure 4 also illustrates the percentage of RODs selecting at least one *innovative technology*, as updated by current project status information. Out of a total of 914 source control RODs signed through FY 1993, innovative technologies were selected and are still being considered or used for approximately 29 percent of source control RODs. Overall, 22 percent of all RODs have included innovative technologies.

FIGURE 4
***SUPERFUND REMEDIAL ACTIONS:* TREATMENT AND DISPOSAL DECISIONS FOR SOURCE CONTROL**



Source: USEPA Office of Emergency and Remedial Response

Note: Data for innovative technologies are derived from Records of Decision (RODs) for fiscal years 1982 – 1993 and anticipated design and construction activities as of June 1994. More than one technology per site may be used.

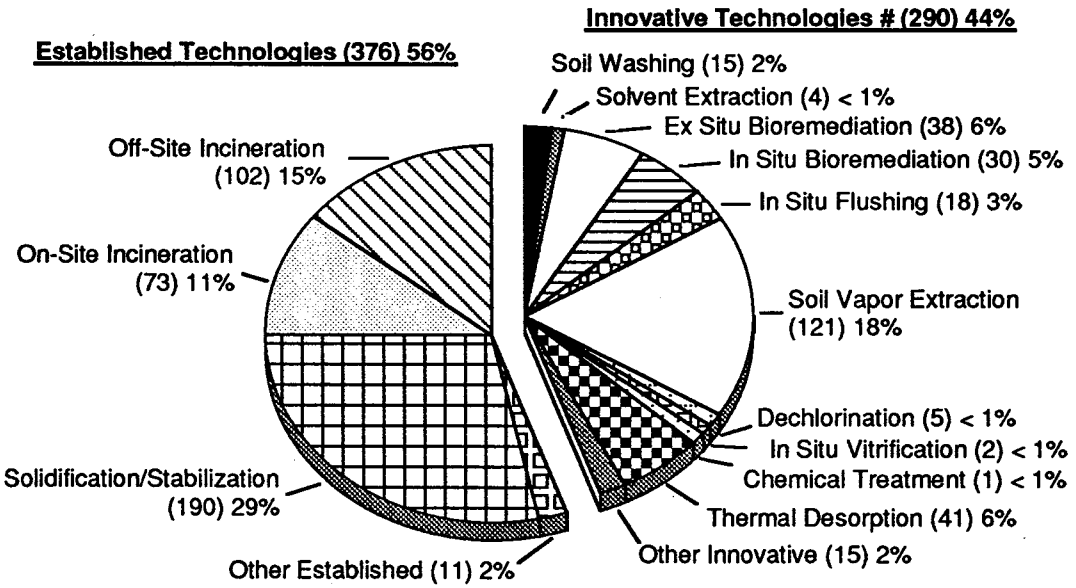
Technology Statistics Another way of illustrating the greater use of treatment is by quantifying the number and kinds of treatment technologies selected and used. Most of the remainder of the information contained in this chapter focuses on technologies, rather than RODs. In each ROD in which treatment was specified, several alternative treatment technologies may have been selected.

Through FY 1993, 642 treatment technologies have been selected in 588 source control RODs specifying some treatment. In addition, EPA has selected in situ treatment of ground water for 24 remedial sites for a total 666 treatment technologies. EPA selected in situ

treatment of groundwater for three remedial sites in FY 1993. The selection of multiple technologies results from the use of treatment trains or from the treatment of different wastes or areas of the site. For the 588 RODs specifying treatment for source control, Figure 5 lists each type of treatment technology selected and how often it has been selected or used for source control. Figure 5 illustrates that, through FY 1993, 44 percent of the 666 treatment technologies selected were innovative and 56 percent were established. Table A-1, appearing in Appendix A, contains summary information on the innovative treatment technology projects at remedial sites. Table A-2 lists sites using established technologies. Information on the established treatment technologies is based on a review by the Office of Emergency and Remedial Response (OERR) rather than interviews of Regional or State staff.

FIGURE 5
***SUPERFUND REMEDIAL ACTIONS:* SUMMARY OF ALTERNATIVE TREATMENT TECHNOLOGIES SELECTED THROUGH FISCAL YEAR 1993**

(Total Number of Technologies = 666)



Note: Data are derived from 1982 – 1993 Records of Decision (RODs) for fiscal years and anticipated design and construction activities as of July 1994. More than one technology per site may be used.

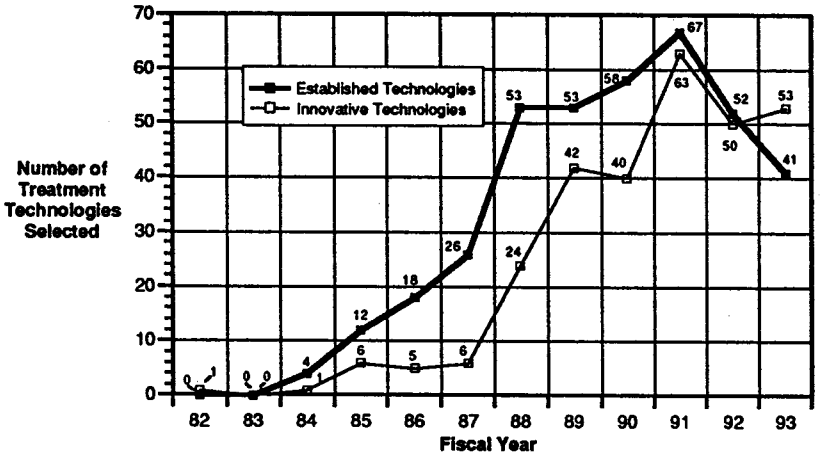
( ) Number of times this technology was selected or used.

** "Other" established technologies are soil aeration, in situ flaming, and chemical neutralization. "Other" innovative technologies are air sparging, contained recovery of oily wastes, limestone barriers, and fuming gasification.*

 # Includes 24 in situ groundwater treatment remedies.

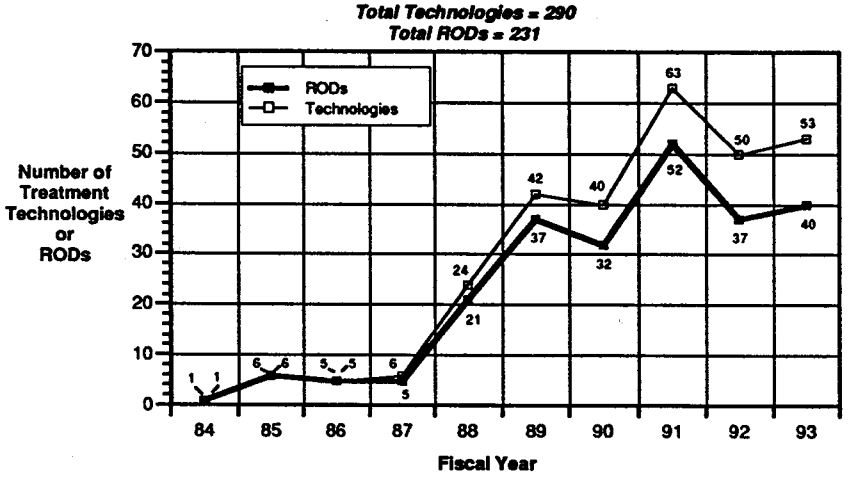
Figure 6 compares the numbers of established and innovative technologies by fiscal year. The figure indicates that more innovative technologies than established technologies have been selected in RODs in fiscal years 1991 and 1993. Figure 7 compares the number of innovative technologies selected with the number of sites. This graph illustrates that some sites are using more than one innovative technology, often together in "treatment trains." The figure also indicates that the ratio of innovative technologies to sites has increased every year since FY 1986. Figure 8 gives the frequency of selection for each innovative technology by fiscal year. Figure 9 shows the frequency of selection for the four most frequently selected innovative treatment technologies, including soil vapor extraction by fiscal year.

FIGURE 6
SUPERFUND REMEDIAL ACTIONS: NUMBER OF ESTABLISHED VERSUS INNOVATIVE TREATMENT TECHNOLOGIES



Note: Data for innovative technologies are derived from Records of Decision (RODs) for fiscal years 1982 – 1993 and anticipated design and construction activities as of June 1994. More than one technology per site may be used.

FIGURE 7
SUPERFUND REMEDIAL ACTIONS: NUMBER OF INNOVATIVE TREATMENT TECHNOLOGIES VERSUS CORRESPONDING RODS



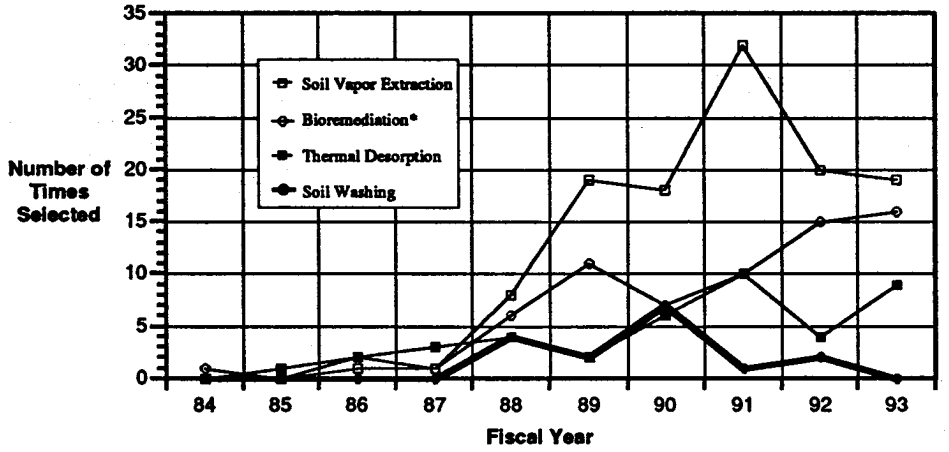
Note: Data derived from 1982 – 1993 Records of Decision (ROD) and anticipated design and construction activities as of June 1994. Number of RODs in a fiscal year usually equals the number of sites.

FIGURE 8
SUPERFUND REMEDIAL ACTIONS: INNOVATIVE TREATMENT TECHNOLOGIES BY YEAR

Technology	Fiscal Year 1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	TOTAL
Soil Vapor Extraction	0	2	2	1	8	19	18	32	20	19	121
Bioremediation (Ex Situ)	1	0	1	0	4	8	4	4	9	7	38
Thermal Desorption	0	1	1	3	4	2	7	10	4	9	41
Bioremediation (In Situ)	0	1	0	2	2	3	3	4	6	9	30
Soil Washing	0	0	0	0	4	2	6	1	2	0	15
In Situ Flushing	0	1	1	0	2	3	1	4	4	2	18
Other	0	0	0	0	0	1	0	4	4	6	15
Dechlorination	0	1	0	0	0	0	1	2	0	1	5
Solvent Extraction	0	0	0	0	0	3	0	1	0	0	4
Chemical Treatment	0	0	0	0	0	0	0	0	1	0	1
Vitrification	0	0	0	0	0	1	0	1	0	0	2
TOTAL	1	6	5	6	24	42	40	63	50	53	290

NOTE: Data derived from Fiscal Year 1982 – 1993 Records of Decision (RODs) and anticipated design and construction activities as of June 1994

FIGURE 9
SUPERFUND REMEDIAL ACTIONS: TRENDS IN THE SELECTION OF FOUR INNOVATIVE TREATMENT TECHNOLOGIES



** Also includes in situ groundwater treatment.*

NOTE: Data derived from Fiscal Year 1982 – 1993 Records of Decision (RODs) and anticipated design and construction activities as of June 1994

Status of Innovative Technology Implementation

Many of the innovative technologies documented in this report have been selected in the last several years. The design of such projects typically takes one to three years; therefore, relatively few innovative technologies have been contracted for and installed, and even fewer have been completed (Figure 10). In the next several years, though, many projects now in design should become operational. The summary matrix presents remedial action sites using innovative treatment technologies by status and specific technology. Table E-1 in Appendix E presents detailed information on remedial projects that have been completed.

FIGURE 10
***SUPERFUND REMEDIAL ACTIONS:* PROJECT STATUS OF INNOVATIVE TREATMENT TECHNOLOGIES AS OF SEPTEMBER 1994**

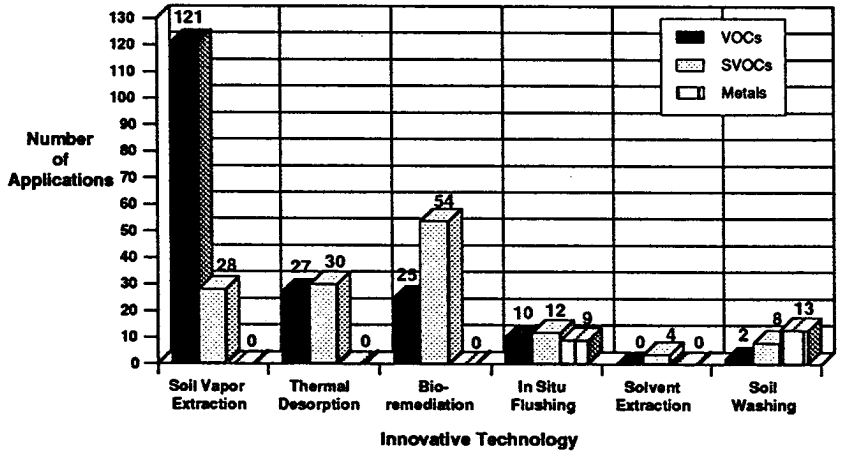
Technology	Predesign/ In Design	Design Complete/ Being Installed/ Operational	Project Completed	Total
Soil Vapor Extraction	69	42	10	121
Thermal Desorption	26	7	8	41
Ex Situ Bioremediation	24	12	2	38
In Situ Bioremediation	14	14	2	30
Soil Washing	11	3	1	15
In Situ Flushing	14	3	1	18
Dechlorination	3	1	1	5
Solvent Extraction	3	1	0	4
In Situ Vitrification	1	1	0	2
Chemical Treatment	1	0	0	1
Other Innovative Treatment	12	3	0	15
Total	**178 (61%)**	**87 (30%)**	**25 (9%)**	**290**

Note: Data are derived from 1982 – 1993 Records of Decision (RODs) and anticipated design and construction activities as of June 1994.

Contaminants Addressed by Innovative Treatment Technologies

The data collected for this report form the basis for an analysis of the classes of contaminants treated by each technology type at remedial action sites. Figure 1-11 provides this information, by technology, for three major contaminant groups: volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and metals. For this report, compounds are categorized as VOCs or SVOCs, according to the lists provided in EPA's SW-846 Test Methods 8240 and 8270, respectively.

FIGURE 11
***SUPERFUND REMEDIAL ACTIONS:* APPLICATION OF INNOVATIVE TREATMENT TECHNOLOGIES**



Quantity of Soil Addressed

EPA analyzed the quantity of soil treated at 209 sites using innovative treatment technologies, and for which quantity data were available (Figure 12). This analysis provides an indication of the scale of the projects involved.

Treatment Trains

Innovative treatment technologies in this report may be used with established or other innovative treatment technologies in treatment trains. Technologies may be combined to reduce the volume of material requiring further treatment, to prevent the emission of volatile contaminants during excavation and mixing, or to address multiple contaminants in a single medium. Appendix E presents the data on treatment trains contained within this report. Tables E-4 and E-5 lists the sites at which treatment trains are being used.

FIGURE 12

***SUPERFUND REMEDIAL ACTIONS:* QUANTITIES OF SOIL TO BE TREATED BY INNOVATIVE TECHNOLOGIES**

Technology	Number Of Sites With Data (Total Number Of Sites)	Quantity (Cubic Yards)		
		Range	Average	Total
In Situ Flushing	11 (18)	5,200 - 650,000	90,000	990,100
Soil vapor extraction	86 (121)	60 - 2,000,000	85,000	7,346,745
Bioremediation (in situ)	12 (30)	5,000 - 250,000	54,000	653,450
Soil washing	15 (15)	1,800 - 200,000	35,100	526,500
Sovent extraction	4 (4)	9,000 - 85,000	42,000	167,500
Bioremediation (ex situ)	32 (38)	1,000 - 208,000	42,000	1,304,195
Thermal desorption	38 (41)	1,800 - 130,000	21,000	808,200
Dechlorination	3 (5)	700 - 48,000	22,000	66,500
Vitrification	2 (2)	1,500 - 5,000	3,250	6,500
Chemical treatment	1 (1)	3,000	3,000	3,000
Other	5 (15)	1,000 - 45,000	200	87,259
TOTAL	**209 (290)**	–	–	**11,960,049**

SECTION 2: SUPERFUND REMOVAL ACTIONS

Superfund removal actions are conducted in response to an immediate threat caused by a release of hazardous substances. Removal action decisions are documented in an action memorandum. To date, innovative treatment technologies have been used in relatively few removal actions. The innovative technologies addressed in this report have been used 31 times in 26 removal actions (Figure 13). In addition, infrared incineration, no longer considered innovative, was first used at two removal actions.

Many removals involve small quantities of waste or immediate threats requiring quick action to alleviate the hazard. Often, such activities do not lend themselves to on-site treatment approaches. In addition, SARA does not prescribe the same preference for innovative treatment for removals that it does for remedial actions.

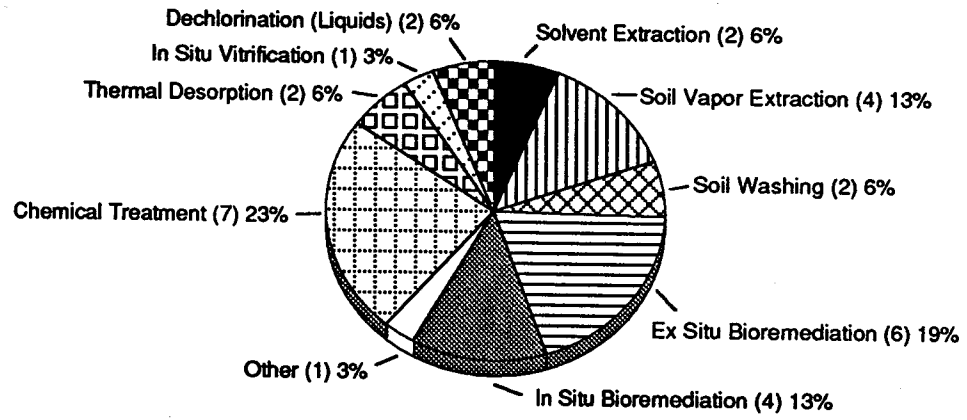
EPA would like to increase the use of innovative treatment methods to address removal problems. One of the seven initiatives set forth in the EPA directive described in the foreword concerns removal actions. It is expected that innovative treatment technologies will be used more often in the future, for larger, and less time-critical removal actions.

Table B-1 in Appendix B provides detailed information for each application of an innovative technology at a removal site. The summary matrix presents summaries by EPA Region and status for all applications of innovative technologies at removal sites.

Frequency of Technology Selection

Figure 13 lists each type of innovative treatment technology and indicates how often that technology has been selected as a remedy for removal actions. Figure 13 illustrates that chemical treatment was selected most often and represented 23 percent of all applications of innovative treatment technologies at removal sites. Bioremediation (ex situ) was chosen six times and represented 19 percent of all applications of innovative treatment technologies at removal sites.

FIGURE 13
SUPERFUND REMOVAL ACTIONS:
SUMMARY OF INNOVATIVE TECHNOLOGIES SELECTED/USED AS OF JUNE 1994
(Total = 31)



Note: Data from a survey of EPA Regional Removal Branch chiefs and On-Scene Coordinators. ( ) *Number of times this technology was selected or used.*
* *Includes one in situ groundwater treatment.*

Status of Innovative Technology Implementation

Figure 14 indicates the status of innovative treatment technologies that are being applied at removal action sites. Since removals are responses to an immediate threat and often involve smaller quantities of hazardous wastes than remedials, the implementation of the technology may progress faster at a removal site than at a remedial site. The figure indicates that a large percentage, 58 percent, of removal projects involving innovative treatment technologies have been completed. The Summary Matrix provides information on removal action sites using innovative treatment technologies by status and specific technology. Table E-2 in Appendix E provides detailed information on removal projects that have been completed.

FIGURE 14
SUPERFUND REMOVAL ACTIONS:
PROJECT STATUS OF INNOVATIVE TREATMENT TECHNOLOGIES AS OF SEPTEMBER 1994*

Technology	Predesign/ In Design	Design Complete/ Being Installed/Operational	Project Completed	Total
Soil Vapor Extraction	0	1	3	4
Thermal Desorption	0	1	1	2
Ex Situ Bioremediation	1	2	3	6
In Situ Bioremediation #	0	1	3	4
Soil Washing	0	1	1	2
In Situ Flushing	0	0	0	0
Dechlorination	0	0	2	2
Solvent Extraction	0	0	2	2
In Situ Vitrification	0	1	0	1
Other Innovative Treatment	0	1	0	1
Chemical Treatment	0	1	6	7
TOTAL	**1 (3%)**	**9 (29%)**	**21 (68%)**	**31**

* *Data derived from a survey of EPA Superfund Removal Branch Chiefs and On-Scene Coordinators for each Region.*

\# *Includes one in situ groundwater treatment.*

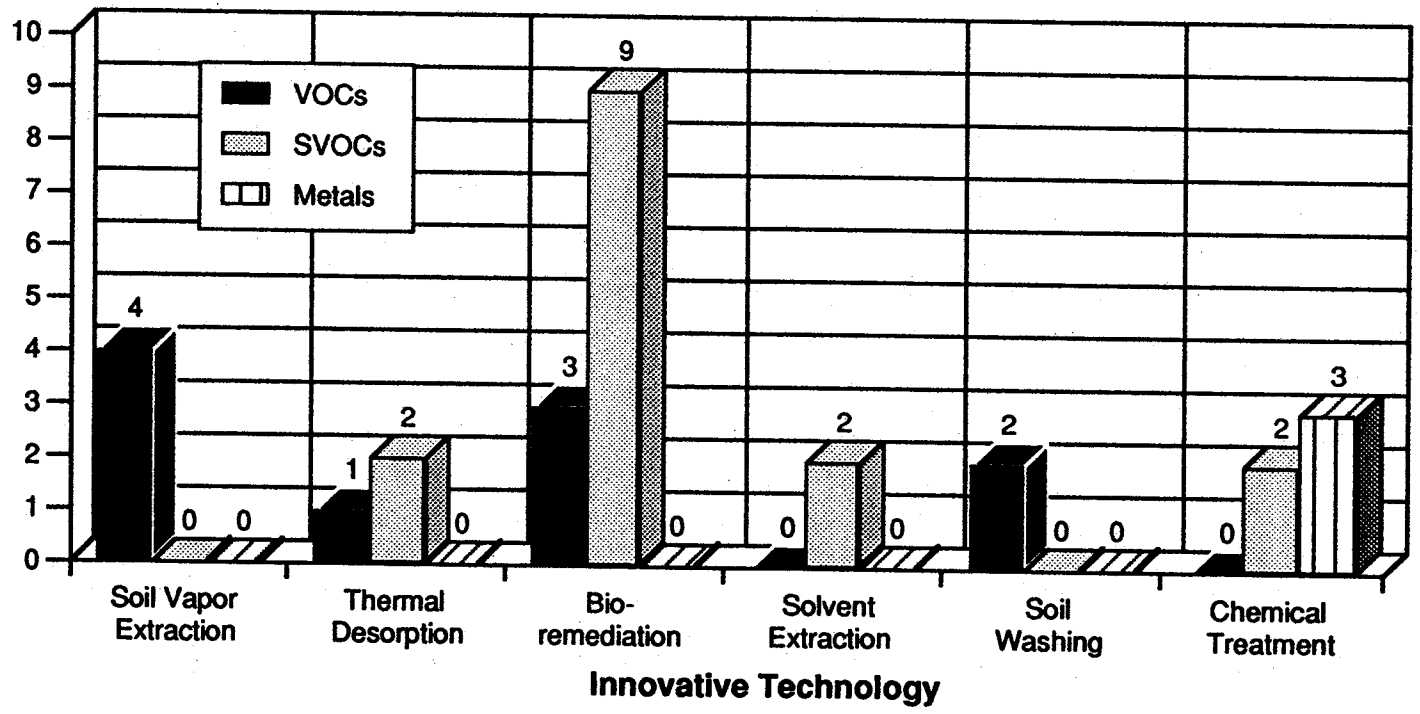
Contaminants Addressed by Innovative Treatment Technologies

Figure 15 provides information, by technology, for three major contaminant groups treated at removal action sites: volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and metals. For this report, compounds are categorized as VOCs or SVOCs, using the lists provided in EPA's SW-846 Test Methods 8240 and 8270, respectively.

Treatment Trains

Innovative treatment technologies in this report may be used together with established or other innovative treatment technologies in treatment trains. Technologies may be combined to reduce the volume of material requiring further treatment, to prevent the emission of volatile contaminants during excavation and mixing, or to address multiple contaminants in a single medium. Table E-5 in Appendix E lists the sites at which such treatment trains are being used.

FIGURE 15
***SUPERFUND REMOVAL ACTIONS:* APPLICATION OF INNOVATIVE TREATMENT TECHNOLOGIES**

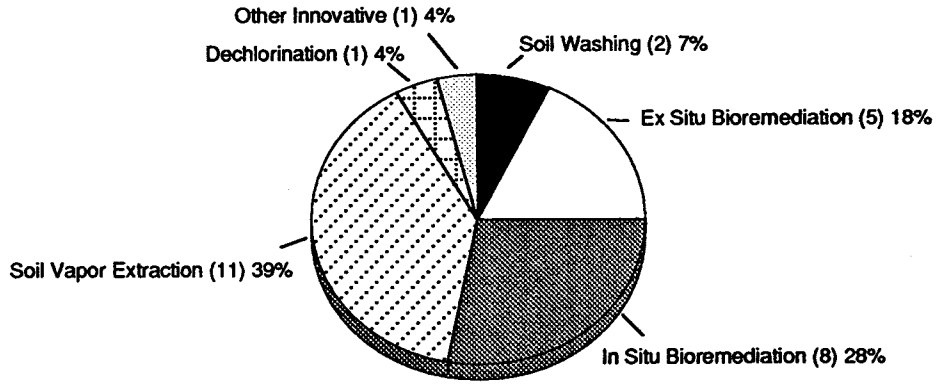


SECTION 3: ACTIONS UNDER OTHER FEDERAL PROGRAMS

This chapter contains available information on projects conducted under other federal programs that are not part of the Superfund program (non-Superfund sites). Many of these projects take place at DoD and DOE facilities. Many of the DoD projects are funded by the Defense Environmental Restoration Program (DERP), which includes the installation restoration program (IRP) and the formerly used defense sites (FUDS) program in DoD. These sites were identified through various sources of information, including discussions with DoD and DOE personnel. However, this list of sites should not be considered comprehensive.

This chapter contains information on the application of innovative technologies at 28 non-Superfund sites. Figure 16 lists each type of innovative treatment technology and the number of times it has been selected as a remedy at a non-Superfund site. Figure 17 indicates the status of innovative technologies being applied at non-Superfund sites. The Summary Matrix provides information on each application by status and EPA Region. Table C-1 in Appendix C provides detailed information on each application. Table E-3 in Appendix E lists details on completed applications.

FIGURE 16
SAMPLE OF PROJECTS UNDER OTHER FEDERAL PROGRAMS:
SUMMARY OF TREATMENT TECHNOLOGIES AS OF JUNE 1994*
(Total Number of Technologies = 28)



Note: Data are derived from a survey of U.S. Army Corps of Engineers sites and projects listed in the Synopses of Federal Demonstrations of Innovative Site Remediation Technologies, Second Edition EPA/542/B-92/003. More than one technology per site may be used.

( ) Number of times this technology was selected or used.

* *"Other" innovative technologies are air sparging and contained recovery of oily wastes.*

\# *Inclusion in situ groundwater treatment remedies.*

FIGURE 17
SAMPLE OF PROJECTS UNDER OTHER FEDERAL PROGRAMS:
STATUS OF INNOVATIVE TREATMENT TECHNOLOGIES AS OF SEPTEMBER 1994*

Technology	Predesign/ In Design	Design Complete/ Being Installed/Operational	Project Completed	Total
Soil Vapor Extraction	5	5	1	11
Thermal Desorption	0	0	0	0
Ex Situ Bioremediation	0	2	3	5
In Situ Bioremediation#	0	6	2	8
Soil Washing	0	1	1	2
In Situ Flushing	0	0	0	0
Dechlorination	0	1	0	1
Solvent Extraction	0	0	0	0
In Situ Vitrification	0	0	0	0
Other Innovative Treatment	0	1	0	1
Chemical Treatment	0	0	0	0
TOTAL	**5 (18%)**	**16 (57%)**	**7 (25%)**	**28**

* *Data derived from a survey of EPA Superfund Removal Branch Chiefs and On-Scene Coordinators for each Region.*

\# *Also includes in situ groundwater treatment.*

Site Status and Technology Summary Matrix

Region 1

Region	Site Name, State	Status	Action	Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
				Technology Type										
1	Kellogg-Deering Well Field, CT	D	Remedial						●					
1	Linemaster Switch Corporation, CT	PD	Remedial						●					
1	Silresim, MA	I	Remedial						●					
1	Iron Horse Park, MA	O	Remedial		●									
1	Re-Solve, MA	O	Remedial									●		
1	Norwood PCBs, MA	D	Remedial								●			
1	Cannon Engineering/Bridgewater, MA	C	Remedial									●		
1	Groveland Wells, MA	O	Remedial						●					
1	Wells G&H OU 1, MA	O	Remedial						●					
1	Hocomonco Pond, ESD, MA	I	Remedial	●										
1	Union Chemical Co., OU 1, ME	D	Remedial						●					
1	O'Connor, ME	D	Remedial								●			
1	McKin, ME	C	Remedial									●		
1	Mottolo Pig Farm, NH	O	Remedial						●					
1	South Municipal Water Supply Well, NH	I	Remedial						●					● a
1	Tinkham Garage (OU 1), NH	D	Remedial						●					
1	Ottati & Goss, NH	C	Remedial									●		
1	Tibbetts Road, NH	PD	Remedial						●					
1	Stamina Mills, RI	PD	Remedial						●					
1	Picillo Farm Site, RI	PD	Remedial						●					
1	Peterson/Puritan Inc. (OU 1), RI	PD	Remedial						●					● e

Status: PD = Predesign; D = Design; D/I = Designed but not installed; I = Installed or being installed; O = Operational; C = Complete
Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; d = Fuming gasification e = insitu oxidation

Site Status and Technology Summary Matrix

Region 2

Region	Site Name, State	Status	Action	Technology Type: Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
2	A O Polymer, Soil treatment phase, NJ	D	Remedial						●					
2	Swope Oil & Chem Co., OU 2, NJ	D	Remedial						●					
2	FAA Technical Center, NJ	I	Remedial	●					●					
2	Myers Property, NJ	D	Remedial			●				●				
2	Lipari Landfill (OU 2), NJ	O	Remedial				●							
2	Vineland Chemical, OU 1 and OU 2, NJ	D	Remedial				●			●				
2	King of Prussia, NJ	C	Remedial							●				
2	Metaltec/Aerosystems, OU 1 - Soil Treatment, NJ	O	Remedial									●		
2	Reich Farms, NJ	D	Remedial									●		
2	Waldick Aerospace Devices (OU 1), NJ	C	Remedial									●		
2	South Jersey Clothing, NJ	D	Remedial						●					
2	Garden State Cleaners, NJ	O	Remedial						●					
2	Lipari Landfill Marsh Sediment, NJ	I	Remedial									●		
2	Industrial Latex, OU 1, NJ	PD	Remedial									●		
2	Vineland Chemical, NJ	C	Removal			●								
2	Zschiegner Refining Company, NJ	C	Removal			●								
2	Universal Oil Products, NJ	D	Remedial									●		
2	Naval Air Engineering Center, OU 23, NJ	D	Remedial						●					
2	Circuitron Corporation, OU 1, NY	D	Remedial						●					
2	Mattiace Petrochemicals Company, OU 1, NY	PD	Remedial						●					
2	Applied Environmental Services, OU 1, NY	D/I	Remedial	●					●					● a

Status: PD = Predesign; D = Design; D/I = Designed but not installed; I = Installed or being installed; O = Operational; C = Complete
Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 2

Region	Site Name, State	Status	Action	Technology Type: Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
2	Genzale Plating Company, OU 1, NY	D	Remedial						●					
2	Signo Trading/Mt. Vernon, NY	C	Removal			●								
2	Wide Beach Development, NY	C	Remedial			●								
2	Byron Barrel & Drum, NY	PD	Remedial				●							
2	American Thermostat, NY	O	Remedial									●		
2	Fulton Terminals, Soil Treatment, NY	D	Remedial									●		
2	Sarney Farm, NY	D	Remedial									●		
2	SMS Instruments (Deer Park), NY	C	Remedial						●					
2	Vestal Water Supply 1-1, NY	D	Remedial						●					
2	Claremont Polychemical - Soil Remedy, NY	D	Remedial									●		
2	Solvent Savers, NY	PD	Remedial									●		
2	Applied Environmental Services (Groundwater), NY	I	Remedial	●										
2	General Motors/Central Foundry Div., OU 2, NY	D	Remedial		●									
2	General Motors/Central Foundry Div., OU 1, NY	D	Remedial		●									
2	Pasley Solvents and Chemicals, Inc., NY	D	Remedial				●		●					
2	GCL Tie and Treating, NY	D	Removal		●									
2	Reynolds Metals Co. Study Area Site, (RMC), NY	D	Remedial									●		
2	GE Wiring Devices, PR	D	Remedial							●				
2	Upjohn Manufacturing Co., PR	C	Remedial						●					
2	Janssen Inc., PR	I	Remedial						●					

Status: PD = Predesign; D = Design; D/I = Designed but not installed; I = Installed or being installed; O = Operational; C = Complete
Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 3

Region	Site Name, State	Status	Action	Technology Type: Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
3	Delaware Sand and Gravel, DE	PD	Remedial	●					●					
3	Cryochem, OU 3, PA	D	Remedial						●					
3	Whitmoyer Laboratories, OU 3, PA	D	Remedial		●									
3	U.S.A. Letterkenny SE Area, OU1, PA	O	Remedial									●		
3	Bendix, PA	PD	Remedial						●					
3	Lord-Shope Landfill, PA	D/I	Remedial						●					
3	Tyson's Dump, PA	O	Remedial						●					
3	Brodhead Creek, OU 1, PA	I	Remedial											● c
3	Tonolli Corporation, PA	PD	Remedial											● b
3	Raymark, PA	O	Remedial						●					
3	Brown's Battery Breaking Site, OU 2, PA	PD	Remedial											● b,d
3	Saegertown Industrial Area Site, PA	D	Remedial						●					● a
3	William Dick Lagoons, OU 3, PA	PD	Remedial									●		
3	Arrowhead Associates/Scovill, OU 1, VA	PD	Remedial						●					
3	Saunders Supply Co, OU 1, VA	D	Remedial				●					●		
3	Avtex Fibers, VA	C	Removal			●								
3	Defense General Supply Center, OU 5, VA	C	Remedial						●					
3	Langley AFB, IRP Site 28, VA	I	Other						●					
3	Rentokil, VA	D	Remedial									●		
3	Ordnance Works Disposal Areas, WV	D	Remedial		●									

Status: PD = Predesign; D = Design; D/I = Designed but not installed; I = Installed or being installed; O = Operational; C = Complete
Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 4

Region	Site Name, State	Status	Action	Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
				Technology Type										
4	Ciba-Geigy (MacIntosh Plant) OU 2, AL	PD	Remedial				●					●		
4	Ciba-Geigy (MacIntosh Plant) OU 4, AL	PD	Remedial				●					●		
4	Brown Wood Preserving, FL	C	Remedial		●									
4	Dubose Oil Products, FL	O	Remedial		●									
4	Cabot Carbon/Koppers, FL	D	Remedial	●	●					●				
4	Whitehouse Waste Oil Pits (amended ROD), FL	D	Remedial		●					●				
4	Hollingsworth Solderless, FL	C	Remedial						●					
4	Peak Oil/Bay Drums OU 1, FL	PD	Remedial	●			●							
4	Robins AFB, Landfill / Sludge Lagoon, OU 1, GA	PD	Remedial						●					
4	General Refining, GA	C	Removal								●			
4	Basket Creek Surface Impoundment, GA	C	Removal						●					
4	Mathis Brothers - S. Marble Top Road Landfill, GA	D	Remedial		●									
4	Smith's Farm Brooks, OU 1, KY	O	Remedial			●						●		
4	Southeastern Wood Preserving, MS	C	Removal		●					●				
4	Charles Macon Lagoon, Lagoon #7, OU 1, NC	D	Remedial						●					
4	Aberdeen Pesticide Dumps, (OU 1 & OU 4), NC	PD	Remedial									●		
4	JADCO-Hughes, NC	D	Remedial				●		●					
4	Carolina Transformer, NC	D	Remedial								●			
4	Cape Fear Wood Preserving, NC	D/I	Remedial		●					●				
4	Benfield Industries, NC	D	Remedial		●									
4	Potter's Septic Tank Service Pits, NC	D	Remedial									●		
4	JFD Electronics/Channel Master, NC	D	Remedial			●								

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Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 4

Region	Site Name, State	Status	Action	Technology Type: Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
4	FCX-Washington Site, NC	I	Removal									●		
4	USMC Camp Lejeune Military Base, OU 2, NC	D	Remedial							●				
4	Hinson Chemical, SC	C	Removal							●				
4	SCRDI Bluff Road, SC	D	Remedial							●				
4	Medley Farm, OU 1, SC	D/I	Remedial							●				
4	Wamchem, SC	C	Remedial									●		
4	Sangamo/Twelve-Mile/Hartwell PCB, OU 1, SC	D	Remedial									●		
4	Savannah River DOE, M Area Settling Basin, SC	O	Other	●						●				● [a]
4	CSX McCormick Derailment Site, SC	C	Removal	●						●				
4	Rochester Property, SC	PD	Remedial											● [a]
4	Helena Chemical, SC	D	Remedial		●		●							
4	Para-Chem Southern, Inc., SC	PD	Remedial		●									
4	Arlington Blending & Packaging Co., OU 1, TN	D	Remedial									●		
4	Carrier Air Conditioning, TN	D/I	Remedial							●				

Status: PD = Predesign; D = Design; D/I = Designed but not installed; I = Installed or being installed; O = Operational; C = Complete
Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 5

Region	Site Name, State	Status	Action	Technology Type: Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
5	Galesburg/Koppers, IL	D	Remedial		●									
5	Outboard Marine/Waukegan Harbor, OU 3, IL	C	Remedial									●		
5	Acme Solvent Reclaiming, Inc. OU 3 & OU 6, IL	D	Remedial						●			●		
5	Enviro. Cons. and Chem. (ROD Amend), IN	D	Remedial						●					
5	Main Street Well Field, IN	D	Remedial						●					
5	Seymour Recycling, IN	C	Remedial	●					●					
5	Fisher Calo Chem, IN	D	Remedial						●					
5	MIDCO I, IN	PD	Remedial						●					
5	Wayne Waste Reclamation, IN	D/I	Remedial						●					
5	Seymour Recycling (Ground water), IN	O	Remedial	●										
5	MIDCO II, IN	PD	Remedial						●					
5	American Chemical Services, IN	PD	Remedial						●			●		
5	Indiana Wood Treating, IN	O	Removal		●									
5	Reilly Tar and Chemical, IN	PD	Remedial									●		
5	Ninth Avenue Dump, IN	C	Remedial				●							
5	Carter Industries, MI	D	Remedial									●		
5	Sturgis Municipal Well Field, MI	PD	Remedial						●					
5	Chem Central, MI	D	Remedial						●					
5	ThermoChem, Inc. OU 1, MI	D	Remedial						●					
5	Verona Well Field, OU 2, MI	O	Remedial						●					
5	Anderson Development (ROD Amendment), MI	C	Remedial									●		

Status: PD = Predesign; D = Design; D/I = Designed but not installed; I = Installed or being installed; O = Operational; C = Complete
Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 5

Region	Site Name, State	Status	Action	Technology Type											
				Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
5	Cliffs/Dow Dump, MI	D	Remedial		●									
5	PBM Enterprises (Van Dusen Airport Service), MI	C	Removal			●								
5	Ionia City Landfill, MI	D	Remedial					●						
5	Parsons Chemical (ETM Enterprise), MI	C	Removal					●						
5	Kysor of Cadillac Industrial, MI	D	Remedial						●					
5	Springfield Township Dump, MI	D	Remedial						●					
5	Verona Well Field (T. Solv/Raymond Rd), MI	C	Remedial						●					
5	Rasmussen Dump, MI	D	Remedial				●							
5	Saginaw Bay Confined Disposal Facility, MI	C	Other							●				
5	Electro-Voice, OU 1, MI	PD	Remedial						●					
5	Clare Water Supply, MI	PD	Remedial						●					
5	Peerless Plating, MI	D	Remedial						●					
5	Duell-Gardner Landfill, MI	PD	Remedial									●		
5	Ott/Story/Cordova Chemical, MI	D	Remedial									●		
5	Burlington Northern RR Tie Treating Plant, MN	O	Remedial		●									
5	Joslyn Manufacturing and Supply Co., MN	O	Remedial		●									
5	Twin Cities Army Ammunition Plant, MN	O	Remedial							●				
5	Long Prairie Groundwater Contamination, MN	D/I	Remedial						●					
5	Allied Chem & Ironton Coke, OU 2, OH	D	Remedial	●	●									● f
5	Zanesville Well Field, OH	PD	Remedial							●				
5	Zanesville Well Field, OH	D	Remedial						●					

Status: PD = Predesign; D = Design; D/I = Designed but not installed; I = Installed or being installed; O = Operational; C = Complete
Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 5

Region	Site Name, State	Status	Action	Technology Type: Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
5	Pristine (ROD Ammendment), OH	I	Remedial						●					
5	Pristine (ROD Ammendment), OH	C	Remedial									●		
5	Miami County Incinerator, OH	D	Remedial						●					
5	Skinner Landfill, (002), OH	PD	Remedial						●					
5	Muskago Sanitary Landfill, WI	D/I	Remedial						●					
5	Wausau Groundwater Contamination	O	Remedial						●					
5	Moss American, WI	PD	Remedial		●									
5	Moss American, WI	PD	Remedial							●				
5	Hagen Farm Site, Ground water, WI	D	Remedial	●										
5	Hagen Farm Source Control OU, WI	O	Remedial						●					
5	Onalaska Municipal Landfill, WI	O	Remedial	●										
5	City Disposal Corporation Landfill, WI	PD	Remedial						●					

Status: PD = Predesign; D = Design; D/I = Designed but not installed; I = Installed or being installed; O = Operational; C = Complete
Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 6

Region	Site Name, State	Status	Action	Technology Type										
				Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
6	Arkwood, AR	D	Remedial							●				
6	MacMillan Ring Free Oil Company, AR	I	Removal		●									
6	Popile, AR	PD	Remedial	●	●									
6	Old Inger Oil Refinery, LA	O	Remedial		●									
6	Pab Oil & Chemical Services, LA	PD	Remedial		●									
6	American Creosote Works, Inc. (Winnfield), LA	D/I	Remedial	●										
6	Atchison/Santa Fe/Clovis, NM	O	Remedial	●										
6	Prewitt Abandoned Refinery, NM	PD	Remedial		●					●				● [a]
6	Holloman AFB, Main POL Area, NM	D	Other							●				
6	Holloman AFB, BX Service Station, NM	D	Other							●				
6	Traband Warehouse, OK	C	Removal								●			
6	Oklahoma Refining Co., OK	D	Remedial	●	●									
6	Petro-Chemical Systems, Inc., OU 2, TX	PD	Remedial							●				● [a]
6	North Cavalcade Street, TX	D	Remedial		●									
6	Sheridan Disposal Services, TX	PD	Remedial		●									
6	French Limited, TX	C	Remedial	●										
6	South Cavalcade Street, TX	PD	Remedial				●			●				
6	Koppers/Texarkana, TX	D	Remedial				●			●				
6	United Creosoting, TX	D/I	Remedial								●			
6	Kelly AFB, Site 1100, TX	O	Other	●						●				
6	Matagorda Island AF Range, TX	C	Other		●									
6	Baldwin Waste Oil, TX	C	Removal	●										

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Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 7

Region	Site Name, State	Status	Action	Technology Type										
				Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
7	Vogel Paint & Wax, IA	O	Remedial		●									
7	People's Natural Gas, IA	D/I	Remedial	●										
7	Chemplex (OU 2), IA	PD	Remedial						●					
7	McGraw Edison, IA	PD	Remedial						●					
7	Coleman Operable Unit 29th and Mead, KS	PD	Remedial						●					
7	Pester Refinery Co., KS	PD	Remedial	●				●						
7	Scott Lumber, MO	C	Removal		●									
7	Crown Plating, MO	C	Removal				●							
7	Lee Chemical, MO	O	Remedial					●						
7	Hastings GW Contamination (Colorado Ave), NE	D	Remedial						●					
7	Hastings GW Contamination (Far-Mar Co.), NE	D	Remedial						●					
7	Hastings GW Contamination, Well No. 3, NE	C	Remedial						●					
7	Lindsay Manufacturing, NE	D	Remedial						●					
7	Waverly Groundwater Contamination, NE	O	Remedial						●					
7	Sherwood Medical, NE	PD	Remedial										●	

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Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 8

Region	Site Name, State	Status	Action	Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
				Technology Type										
8	Sand Creek Industrial, OU 5, CO	O	Remedial										●	
8	Sand Creek Industrial OU 1, CO	O	Remedial							●				
8	Chemical Sales Company, OU 1, CO	D	Remedial							●				
8	Martin Marietta (Denver Aerospace), CO	D	Remedial							●			●	
8	Rocky Mtn Arsenal OU 18, interim resp., CO	C	Remedial							●				
8	Ft. Carson, CO	O	Other	●						●				
8	Rocky Flats OU 2, Interim Remedial Action, CO	O	Remedial							●				
8	Broderick Wood Products OU 2, CO	O	Remedial	●	●									
8	Burlington Northern (Somers Plant), MT	O	Remedial	●	●									
8	Libby Ground Water Contamination, MT	O	Remedial	●	●									
8	Former Glasgow AFB, MT	I	Other		●									
8	Idaho Pole Company, MT	D	Remedial	●	●			●						
8	Mouat Industries, MT	O	Removal			●								
8	Montana Pole and Treating Plant, MT	PD	Remedial	●	●			●						
8	Montana Pole/Treating (Ground water), MT	PD	Remedial	●										
8	Wasatch Chemical, UT	C	Remedial		●				●					
8	Utah Power and Light/American Barrel, UT	PD	Remedial							●				
8	Mystery Bridge Road/Highway 20, OU 2, WY	O	Removal							●				● [a]

Status: PD = Predesign; D = Design; D/I = Designed but not installed; I = Installed or being installed; O = Operational; C = Complete
Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 9

Region	Site Name, State	Status	Action	Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
				Technology Type										
9	Aua Fuel Farm, Aua Village, American Samoa,	O	Other	●										
9	Indian Bend Wash, South Area, OU 1, AZ	D	Remedial							●				
9	Gila River Indian Reservation, AZ	C	Removal	●		●								
9	Stanford Pesticide #1, AZ	C	Removal			●								
9	Motorola 52nd Street, AZ	D	Remedial							●				
9	Phoenix-Goodyear Airport Area (N. & S. Fac), AZ	O	Remedial							●				
9	Luke AFB, AZ	C	Other							●				
9	Davis Monthan AFB, Site 35, AZ	I	Other	●						●				
9	Davis Monthan AFB, AZ	C	Other	●						●				
9	Hassayampa Landfill, AZ	D	Remedial							●				
9	Indian Bend Wash, AZ	D	Remedial							●				
9	Williams AFB, (OU2), AZ	O	Remedial	●						●				
9	National Semiconductor (Monolith Memories), CA	O	Remedial							●				
9	Spectra Physics, OU 1, CA	O	Remedial							●				
9	J.H. Baxter, CA	D	Remedial		●									
9	Koppers Company, Inc. (Oroville Plant), CA	D/I	Remedial	●							●			
9	Roseville Drums, CA	C	Removal	●										
9	Solvent Service, CA	O	Remedial							●				
9	Fairchild Semiconductor (San Jose), CA	C	Remedial							●				
9	Fairchild Semiconductor/MTV-I, CA	D/I	Remedial							●				
9	Fairchild Semiconductor/MTV-II, CA	D/I	Remedial							●				
9	IBM (San Jose), CA	O	Remedial							●				

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Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 9

Region	Site Name, State	Status	Action	Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
				Technology Type										
9	Intel, Mountain View, CA	D	Remedial						●					
9	Intersil/Siemens, CA	O	Remedial						●					
9	Raytheon, Mountain View, CA	D	Remedial						●					
9	Watkins-Johnson, CA	I	Remedial						●					
9	Monolithic Memories/AMD - Arques, SU 2, CA	O	Remedial						●					
9	Van Waters and Rogers, CA	O	Remedial						●					
9	Pacific Coast Pipeline, CA	D	Remedial						●					
9	Sacramento Army Depot, Tank 2 OU, CA	C	Remedial						●					
9	USMC, Mtn. Warfare Center, Bridgeport, CA	C	Other		●									
9	Seal Beach Navy Weapons Station IR Site 14, CA	D	Other	●					●					
9	McClellan AFB OUD, CA	O	Other						●					
9	Ft. Ord Marina, Fritzche AAF Fire Drill Area, CA	C	Other		●									
9	Purity Oil Sales OU 2, CA	PD	Remedial						●					
9	Jasco Chemical Co., CA	D	Remedial		●									
9	Signetics (AMD 901) (TRW), Signetics OU, CA	O	Remedial						●					
9	Lawrence Livermore National Laboratory, CA	D	Remedial						●					
9	Sacramento Army Depot (Burn Pits OU), CA	O	Remedial						●					
9	Lorentz Barrel and Drum (OU 1), CA	PD	Remedial						●					
9	Hexcel, CA	PD	Remedial	●					●					● [a]
9	Intersil, CA	C	Remedial						●					
9	U. S. Public Works Center, Guam, GU	O	Other			●								
9	Poly-Carb, NV	C	Removal		●					●				

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Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

Site Status and Technology Summary Matrix

Region 10

Region	Site Name, State	Status	Action	Technology Type: Bioremediation (in situ)	Bioremediation (ex situ)	Chemical Treatment	Dechlorination	In Situ Flushing	In Situ Vitrification	Soil Vapor Extraction	Soil Washing	Solvent Extraction	Thermal Desorption	Other
10	Ft. Wainwright, AK	O	Other		●									
10	Eielson Air Force Base, AK	O	Remedial	●						●				
10	Union Pacific Railroad Sludge Pit, ID	PD	Remedial				●							
10	United Chrome Products, OR	O	Remedial				●							
10	Gould, Inc., OR	O	Remedial								●			
10	Umatilla Army Depot Activity, Soil Op Unit, OR	D/I	Remedial		●									
10	Commencement Bay/S. Tacoma Well 12A, WA	O	Remedial							●				
10	Naval Submarine Base, Bangor Site A, OU 1, WA	I	Remedial								●			
10	Drexler - RAMCOR, WA	C	Removal									●		
10	Harbor Island, WA	PD	Remedial									●		
10	Fairchild AFB OU 1 Craig Rd LF., WA	D	Remedial							●				
10	Fairchild AFB, Priority 1 OU's (OU 2) FT-1, WA	D	Remedial	●										● [a]
10	Fort Lewis Mil Res. Lf 4 & Sol. Refined Coal, WA	D	Remedial							●				● [a]
10	Bonneville Power Administration, OU A, WA	I	Remedial		●									
*	Naval Communication Station, Scottland	C	Remedial	●										

Status: PD = Predesign; D = Design; D/I = Designed but not installed; I = Installed or being installed; O = Operational; C = Complete
Action: Remedial = Superfund Remedial Action; Removal = Superfund Removal Action; Other = Action under other federal programs
Other technologies: a = Air sparging; b = Limestone barriers; c = Contained recovery of oily wastes; and d = Fuming gasification

* Naval Communication Station is located in Scottland, not in Region 10.

Appendix A
Innovative Technologies at Superfund Remedial Actions

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TABLE A-1

REMEDIAL ACTIONS: SITE-SPECIFIC INFORMATION BY INNOVATIVE TREATMENT TECHNOLOGY

Table A-1 is the principal part of this chapter. It contains the most detailed, site-specific information for remedial sites for which an innovative treatment has been selected. The columns of Table A-1 present the following information:

Region

This column indicates the EPA Region in which the site is located.

Site Name, State, ROD Date

This column identifies the site and the operable unit for which an innovative treatment technology was selected.

A Record of Decision (ROD) documents the selection of remedy in the remedial program. The date shown in this column is the date on which a ROD was signed by an EPA official.

An asterisk (*) in this column indicates that a treatability study has been completed for this technology at the particular site.

Specific Technology

The second column describes the specific technology selected within a general category of innovative treatment. For example, within the general category of bioremediation, the specific technologies of land treatment or slurry-phase bioremediation may be chosen.

Site Description

This column provides information on the industrial source of the contamination at the site and allows analysis of the selection of innovative technologies by site type. For example, by using the information in this column, one may determine the most frequently selected innovative technology for wood preserving sites.

Media (quantity)

This column provides information on the media and quantity of material to be treated. If a treatment is used in situ, an effort has been made to include the maximum depth of the treatment to provide the reader with another parameter significant to the application.

TABLE A-1 (Continued)

Key Contaminants Treated

The major contaminants or contaminant groups targeted by the treatment technology are shown in this column. Other contaminants may also be listed that may be treated. Other contaminants that may be present, but that are not to be addressed by the listed technology, are not included.

Status

This column indicates the status of the application of the innovative treatment technology. **Predesign** indicates that the ROD has been signed but design has not begun. During predesign, EPA may be negotiating with the potentially responsible parties, procuring the services of a design firm, or collecting information (such as conducting a treatability study) needed in the design stage. If a project is in **design**, the engineering documents needed to contract for and build the remedy are being prepared. If a remedy is **being installed**, the lead agency has signed a contract for the construction work needed to set up the remedy. The remedy is **operational** if it is completely installed and it is now being operated as a treatment system; the remedy is **completed** if the goals of the ROD or decision document for that treatment technology have been met and treatment has ceased.

One purpose of this column is to identify opportunities for vendors to become involved in the next phase of the project. Whenever possible, the season and year in which the current phase will end is given. The information is identified as the "completion planned" date.

Lead Agency, Treatment Contractor

The "lead" indicates whether federal dollars are to be used to implement the remedy (Fund lead) or the potentially responsible parties will conduct the remedy with oversight by EPA or the State (PRP lead). If a remedy is Fund lead, EPA may manage the design/construction through its contractors, the state may manage the project with Superfund dollars, or the U.S. Army Corps of Engineers (USACE) may act for EPA to manage the design or construction. No matter what agency or organization is responsible for managing the remedy, the contractor responsible for the actual installation and operation of the innovative technology also is identified, if the lead organization has selected a contractor.

Contacts/Phone

This final column provides the names and telephone numbers of useful contacts for the site or technology. The first name listed is usually the EPA remedial project manager (RPM) responsible for the site. If a remedy is being managed by the state, the name and phone number of the state RPM also is provided. Information on other useful contacts may also be provided.

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (Ex situ)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
1	Iron Horse Park*, MA (09/15/88)	Land treatment	Industrial and railyard waste	Sludge (25,000 cy)	PAHs	Operational; Completion planned Summer 1995	PRP lead/Federal oversight; ENSR Consulting	Don McElroy 617-223-5571
2	General Motors/Central Foundry Division, OU 1, NY (12/17/90)	Slurry phase	Machine shops, Engine casting facility	Soil (100,000 cy), Sludge (91,000 cy) from lagoon, Sediments (62,000 cy)	PCBs	In design; Design completion planned Summer 1995; Remedy being reconsidered; thermal desorption and solvent extraction also being evaluated	PRP lead/Federal oversight	Lisa Carson 212-264-6857
2	General Motors/Central Foundry Division, OU 2, NY (03/31/92)	Slurry phase	Aluminum casting plant	Soil (59,000 cy)	PCBs	In design; Design completion planned Summer 1995; Remedy being reconsidered; thermal desorption and solvent extraction also being evaluated	PRP lead/Federal oversight	Lisa Carson 212-264-6857

Bioremediation (Ex situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
3	Whitmoyer Laboratories, OU 3, PA (12/31/90)	Bioremediation (Ex Situ)	Other organic chemical manufacturing	Soil and sediment combined (5,600 cy)	VOCs (TCE), SVOCs (Aniline)	In design; Design completion planned Fall 1995	PRP lead/Federal oversight; Environ	Chris Corbett 215-597-8186
3	Ordnance Works Disposal Areas, WV (09/29/89)	Land treatment	Other organic chemical manufacturing, Other inorganic chemical manufacturing	Soil (13,500 cy)	PAHs (Carcinogenic PAHs)	In design; Design completion planned Summer 1998; Treatability study underway	PRP lead/Federal oversight; ABB Environmental (Design)	Melissa Whittington 215-597-1286
4	Brown Wood Preserving*, FL (04/08/88)	Land treatment	Wood preserving, Drum storage/ disposal	Soil (8,100 cy)	PAHs (Creosote)	Completed; Operational from 1/89 to 7/90	PRP lead/Federal oversight; Remediation Technology, Inc.	Ann Marie Gallespie 404-347-6255
4	Cabot Carbon/Koppers, FL (09/27/90) See also Bioremediation (In Situ), Soil Washing	Slurry phase (preceded by soil washing)	Wood preserving, Pine tar and turpentine manufacturing	Soil fines from approximately 6,400 cy	SVOCs (PCP), PAHs	In design; Design completion planned Fall 1994	PRP lead/Federal oversight	Patsy Goldberg 404-347-6265
4	Dubose Oil Products*, FL (03/29/90)	Solid phase Windrowing with aeration and irrigation in a barn	Petroleum refining and reuse	Soil (30,000 cy)	VOCs (TCE, DCE, Benzenes, Xylenes), SVOCs (PCP), PAHs	Operational; Completion planned December 1994; Operation began 11/93	PRP lead/Federal oversight; Wastech	Mark Fite 404-347-6263 George Linder (FL) 904-488-0190

Bioremediation (Ex situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	Whitehouse Waste Oil Pits (amended ROD)*, FL (06/16/92) See also Soil Washing	Slurry phase preceeded by soil washing	Waste oil recycler	Soil (quantity unknown) Residuals from soil washing	VOCs, PCBs, PAHs	In design; Remedy being reconsidered; further site characterizati on underway	Federal lead/Fund Financed	Tony Best 404-347-6259
4	Mathis Brothers - South Marble Top Road Landfill, GA (03/24/93)	Bioremediation (Ex Situ)	Landfill operation	Soil (97,700 cy)	VOCs, SVOCs, Biocides	In design; Operation planned to start Spring 1995	PRP lead/Federal oversight; Engineering Science	Charles King 404-347-6262
4	Benfield Industries, NC (07/31/92)	Land treatment	Bulk chemical mixing and repackaging plant.	Soil (4,300 cy) fines from soil washing	SVOCs (Creosote)	In design; Design completion planned early 1995	Federal lead/Fund Financed	Jon Bornholm 404-347-7791
4	Cape Fear Wood Preserving, NC (06/30/89) See also Soil Washing	Slurry phase; may be followed by s/s	Wood preserving	Soil (2,400 cy); Also fines from soil washing	VOCs, PAHs	Design completed but not installed; will be installed no earlier than Summer 1995	Federal lead/Fund Financed	Jon Bornholm 404-347-7791
4	Helena Chemical, SC (09/08/93) See also Dechlorination	Bioremediation (Ex Situ) Anaerobic and aerobic	Retail sales outlet for agricultural chemicals	Soil quantity unknown	VOCs (Diesel fuel), Biocides (DDT, Aldrin, Dieldrin, Chlordane, Toxaphene)	In design; Design completion planned Winter 1994	PRP lead/Federal oversight; Ensafe	Bernie Hayes 404-347-7791 Adrian Felder (SC) 803-734-5390

Bioremediation (Ex situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	Para-Chem Southern, Inc., SC (09/27/93)	Slurry phase	Manufacturing Plant - products include polymers, latex, coatings, adhesives	Sludge(200 cy)	VOCs (1,1,1-TCA, DCA, PCE), SVOCs	Predesign; Currently conducting a treatability study	State lead/Fund Financed; The Fletcher Group (prime), RMT (subcontractor)	Terry Tanner 404-347-7791 ext (4117) Mike Klender (SC) 803-734-5471
5	Galesburg/Koppers, IL (06/30/89)	Land treatment	Wood preserving	Soil (15,200 cy)	SVOCs (PCP, Phenols), PAHs (Creosote)	In design; Design completion planned Spring 1997	PRP lead/State oversight; Remediation Technologies, Inc.	Brad Bradley 312-886-4742 Fred Nika (IL) 217-782-6760
5	Cliffs/Dow Dump*, MI (09/27/89)	Bioremediation (Ex Situ)	Waste disposal for charcoal manufacturing plant	Soil (9,500 cy)	VOCs (TCE, BTEX), SVOCs (Phenol), PAHs (Naphthalene)	In design; Design completion planned Fall 1994; Reconsidering which material will be treated	PRP lead/Federal oversight; ENSR (Design)	Ken Glatz 312-886-1434
5	Burlington Northern Railroad Tie Treating Plant*, MN (06/04/86)	Land treatment	Wood preserving	Soil (9,500 cy), Sludge(9,500 cy)	SVOCs (Phenols, Creosote), PAHs	Operational; Completion planned Fall 1994	PRP lead/State-Federal oversight; Remediation Technologies, Inc.	Tony Rutter 312-886-8961 Fred Jenness (MN) 612-297-8470 Richard Truax (RETEC) 303-493-3700

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (Ex situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
5	Joslyn Manufacturing and Supply Co., MN	Land treatment Unlined treatment unit with irrigation and tilling	Wood preserving	Soil (75,000 cy)	SVOCs (PCP, PAHs)	Operational; Completion planned Fall 1994	PRP lead/State oversight; BARR Engineering/GL Contracting, Inc.	Kevin Turner 312-886-4444 Ann Bidwell (MN) 612-296-7827
5	Allied Chem & Ironton Coke, OU 2*, OH (12/28/90) See also Bioremediation (In Situ), Other Technologies	Land treatment	Coke manufacturing	Soil (30,000 cy)	PAHs	In design; Design completion planned early 1995	PRP lead/Federal oversight; IT Corporation (prime contractor, design)	Tom Alcamo 312-886-7278
5	Moss-American*, WI (09/27/90) See also Soil Washing	Slurry phase preceded by soil washing	Wood preserving	Soil (quantity unknown); fines from soil washing	PAHs	Predesign; PD completion planned 1995; Bench-scale study is underway	PRP lead/Federal oversight; Weston, Inc.(prime contractor)/IT Corporation(sub contractor)	Russ Hart 312-886-4844
6	Popile, AR (02/01/93) See also Bioremediation (In Situ)	Land treatment	Inactive wood preserving operation	Soil and Sludge combined (156,000 cy)	SVOCs (PAHs, Phenols)	Predesign; RFP for design to be issued Fall 1994	Federal lead/Fund Financed	Paul Sieminski 214-655-8503
6	Old Inger Oil Refinery*, LA (09/25/84)	Land treatment	Petroleum refining and reuse	Soil and Sludge combined (120,000 cy)	VOCs (Benzene, Ethylbenzene), PAHs (Petroleum hydrocarbons)	Operational; Completion planned Fall 2001	State lead/Fund Financed; Westinghouse Haztech (installation), Operation to start Fall 1994	Paul Sieminski 214-655-8503 Tom Stafford (LA) 504-765-0487

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (Ex situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
6	Pab Oil & Chemical Services, LA (09/22/93)	Bioremediation (Ex Situ) followed by s/s for inorganics	Disposal site for oily drilling mud	Soil (10,900 cy), Sludge (15,500 cy), Sediments (520 cy)	PAHs (Carcinogenic and Non-carcinogenic)	Predesign; Design to begin October 1994; A treatability study will determine the type of bioremediation	PRP lead/Federal oversight	James Van Buskirk 214-665-6767
6	Prewitt Abandoned Refinery, NM (09/30/92) See also Soil vapor extraction, Other Technologies	Bioremediation (Ex Situ)	Crude oil refinery	Soil (1,500 cy), Sludge (1,200 cy)	VOCs (BTEX), PAHs	Predesign	PRP lead/Federal oversight	Monica Chapa-Smith 214-655-6780
6	Oklahoma Refining Co., OK (06/09/92) See also Bioremediation (In Situ)	Bioremediation (Ex Situ) followed by s/s	Petroleum refining and reuse	Soil and sludge combined (56,000 cy), Sediments (quantity unknown)	VOCs, Organics (LNAPLs)	In design; Phase 1 to be completed 4/95; Phase 2 to be completed 5/96	State lead/Fund Financed	Philip Allen 214-665-8516
6	North Cavalcade Street*, TX (06/28/88)	Land treatment	Wood preserving	Soil (5,500 cy)	PAHs (Creosote)	In design; Design completion planned Summer 1994	State lead/Fund Financed	Glenn Celerier 214-655-8523 Stephen Chong (TX) 512-239-2441

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (Ex situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
6	Sheridan Disposal Services*, TX (12/29/88)	Slurry phase	Industrial landfill	Soil (13,000 cy) effected soils, Sludge (30,000 cy) of oils and sludge	VOCs (Benzene, Toluene), SVOCs (Phenols), PCBs	Predesign; Pilot study conducted in 1991; Awaiting entry of consent decrees by court to begin design	PRP lead/State oversight	Gary Baumgarten 214-655-6749
7	Vogel Paint & Wax, IA (09/20/89)	Land treatment using four cells	Paint/ink formation	Soil (40,000 cy)	VOCs (Methyl Ethyl Ketone, BTX)	Operational; Completion planned 1997	PRP lead/State oversight; Vogel	Jack Generaux 913-551-7690 Bob Drustrup (IA) 515-281-8900
8	Broderick Wood Products OU 2, CO (03/24/92) See also Bioremediation (In Situ)	Land treatment	Wood preserving	Soil (85,000 cy), Sediments (120 cy)	SVOCs (PCP), PAHs	Operational; Operation started August 1994; Completion planned 2001	Federal lead/Fund Financed; CH2M Hill	Armando Saenz 303-293-1532
8	Burlington Northern (Somers Plant)*, MT (09/27/89) See also Bioremediation (In Situ)	Land treatment; using 12-acre unit	Wood preserving	Soil (54,000 cy) excavated soil	PAHs (Creosote)	Operational; Operation began 9/93; Completion planned 1999 - 2002	PRP lead/Federal oversight; Remediation Technologies, Inc.	Jim Harris 406-449-5414 (ext. 260)
8	Idaho Pole Company*, MT (09/28/92) See also Bioremediation (In Situ), In situ Flushing	Land treatment	Wood preserving	Soil (19,000 cy), Sediments (2,683 cy)	SVOCs (PCP, PAHs)	In design; Design completion planned Fall 1994	PRP lead/Federal oversight	Jim Harris 406-449-5414 (ext. 260)

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (Ex situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
8	Libby Ground Water Contamination*, MT (12/30/88) See also Bioremediation (In Situ)	Land treatment using two 1-acre cells, soil is excavated & mixed	Wood preserving	Soil (45,000 cy)	VOCs (Benzene), SVOCs (PCP), PAHs (Creosote)	Operational; Completion planned 1999	PRP lead/Federal oversight; Woodward-Clyde	Jim Harris 406-449-5414 (ext. 260) Bert Bledsoe (RSKERL) 405-332-2313
8	Montana Pole and Treating Plant, MT (09/21/93) See also Bioremediation (In Situ), In situ Flushing	Land treatment	Wood preserving	Soil (208,000 cy)	SVOCs (PCP, Dioxins, PAHs)	Predesign; In negotiation	In negotiation	Sara Weinstock 406-782-7415
8	Wasatch Chemical*, UT (03/29/91) See also In situ Vitrification	Land treatment on an asphalt pad	Pesticide manufacturing/use/ storage, Other organic chemical manufacturing, Other inorganic chemical manufacturing	Soil (1,100 cy)	VOCs (Toluene, Xylene)	Completed; Operational from 10/92 to 12/93	PRP lead/Federal oversight; Harding/Lawson	Bert Garcia 303-293-1537
9	J.H. Baxter*, CA (09/27/90)	Land treatment followed by fixation for metals	Wood preserving	Soil (30,000 cy)	SVOCs (PCP, Dioxins, PAHs)	In design; Design completion planned Winter 1994	PRP lead/Federal oversight	Kathy Setian 415-744-2254
9	Jasco Chemical Co., CA (09/30/92)	Bioremediation (Ex Situ) may combine aerobic and anaerobic	Chemical blending and repacking	Soil (1,095 cy)	VOCs (DCA, Methylene chloride, Acetone, Xylene)	In design; Pilot-scale treatability study planned Spring 1994	PRP lead/Federal oversight	Rosemarie Carroway 415-744-2235

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (Ex situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
10	Umatilla Army Depot Activity, Soil Operable Unit*, OR (09/30/92)	Composting	Explosives washout	Soil (7,000 cy)	Explosives (TNT, RDX)	Design completed but not installed; Contract awarded; Operation scheduled for mid-Fall 1994	Army lead/EPA and State oversight; Bioremediation Services, Inc.	Harry Craig 503-326-3689 Mark Daugherty (US Army) 503-564-5294 Mike Nelson (USACE Seattle) 206-764-3458
10	Bonneville Power Administration, OU A, WA (05/06/93)	Solid phase	Research and Testing Facility	Soil (500 cy)	PAHs (PCP)	Being installed; Installation completion planned Fall 1994; Operation to be completed by Winter 1994	Federal facility/EPA and State oversight	Nancy Harney 206-553-6635

Table A-1
REMEDIAL ACTIONS: SITE-SPECIFIC INFORMATION BY TECHNOLOGY THROUGH FY 1993

Bioremediation (In situ)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
1	Hocomonco Pond, ESD, MA (09/30/85)	In situ groundwater	Wood preserving	Groundwater	PAHs (Creosote), Organics (DNAPLs)	Being installed; Installation completion planned Fall 1995	PRP lead/Federal oversight	Bob Leger 617-573-5734
2	FAA Technical Center*, NJ (09/26/89) See also Soil vapor extraction	In situ groundwater Pump & treat followed by H202 addition and reinjection through infiltration galleries	Jet fuel tank farm	Groundwater	VOCs (JP-4)	Being installed	Federal Facility, FAA lead; R.E. Wright	Carla Struble 212-264-4595 Keith Buch (FAA) 609-485-6644
2	Applied Environmental Services (Groundwater), NY (06/24/91)	In situ groundwater, in conjunction w/air sparging & nutrient addition	Bulk petroleum and hazardous waste storage facility	Groundwater	VOCs (BTEX)	Being installed; Remedial action to start in Fall 1994	PRP lead/State oversight; Remediation Technologies, Inc.	Mel Haupton 212-264-7681 John Grathwol 518-457-9280
2	Applied Environmental Services, OU 1, NY (06/24/91) See also Soil vapor extraction, Other Technologies	In situ soil; Bioventing	Bulk petroleum and hazardous waste storage facility, fuel blending	Soil (quantity unknown), Groundwater depth to gw avg. 8 feet	VOCs (BTEX), SVOCs (Naphthalene, Bis(2-ethylhexyl) phthalate)	Being installed; Operation to start September 1994	PRP lead/State oversight; Remediation Technologies, Inc. (Design)	Mel Hauptman 212-264-7681 John Grathwol (NY) 518-457-9280
3	Delaware Sand and Gravel, DE (09/30/93) See also Soil vapor extraction	In situ soil	Landfill site drum disposal area	Soil (14,050 cy)	VOCs (Benzene, TCE, PCE, Methylene Chloride)	Predesign; In negotiation	PRP lead/Federal oversight	Eric Newman 215-597-0910

Bioremediation (In situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	Cabot Carbon/Koppers, FL (09/27/90) See also Bioremediation (Ex Situ), Soil Washing	In situ soil; Treating above/below gw table by nutrient addition	Wood preserving, Pine tar and turpentine manufacturing	Soil (5,000 cy)	SVOCs (PCP), PAHs	In design; Design completion planned Fall 1994	PRP lead/Federal oversight; McLaren-Hart (Design contractor)	Patsy Goldberg 404-347-6265
4	Peak Oil/Bay Drums OU 1, FL (06/21/93) See also In situ Flushing	In situ soil	Waste oil re-refinery	Soil (quantity unknown)	VOCs (PCE, Ethylbenzene), SVOCs (PAHs), PCBs	Predesign; PD completion planned Fall 1994	Federal lead/Fund Financed	David Abbot 404-257-2643
5	Seymour Recycling, IN (09/30/87) See also Soil vapor extraction	In situ soil Nutrients plowed into soil	Chemical waste management and incineration	Soil (190,000 cy) 12 acres to a depth of 10 feet	VOCs (TCA, Carbon Tetrachloride, TCE)	Completed; Operational from 1/87 to 6/90	PRP lead/Federal oversight; ABB Environmental Services	Jeff Gore 312-886-6552
5	Seymour Recycling (Groundwater), IN (09/30/87)	In situ groundwater; Gw treatment incidental to soil treatment	Chemical waste management and incineration	Groundwater under 12 acres	VOCs, SVOCs, PAHs	Operational; Gw treatment was not designed but appears to be occuring as a result of in situ soil treatment	PRP lead/Federal oversight; Geraghty Miller	Jeff Gore 312-886-6552
5	Allied Chem & Ironton Coke, OU 2*, OH (12/28/90) See also Bioremediation (Ex Situ), Other Technologies	Bioremediation (In Situ) of lagoon sediments	Coke manufacturing	Sediments (457,000 cy) from a lagoon	PAHs	In design; Design completion planned Fall 1994; Operation planned to begin Spring 1995	PRP lead/Federal oversight; IT Corporation (prime contractor), Black & Veetch (subcontractor)	Tom Alcamo 312-886-7278

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (In situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
5	Hagen Farm Site, Groundwater Control OU, WI (09/30/92)	In situ groundwater	Industrial landfill, Municipal landfill	Groundwater	VOCs (Vinyl Chloride, MEK, Xylene)	In design; Design completion planned Spring 1995	PRP lead/Federal oversight; Warzyn (prime contractor)	Steve Padovani 312-353-6755
5	Onalaska Municipal Landfill*, WI (08/14/90)	In situ soil; air injection but no nutrient or microbe addition	Municipal landfill	Soil (16,000 cy) to a depth 11 -15 feet	PAHs (Naphthalene)	Operational; Completion sometime between 1996 and 2000.	Federal lead/Fund Financed; CH2M Hill (prime contractor)	Kevin Adler 312-886-7078
6	Popile, AR (02/01/93) See also Bioremediation (Ex Situ)	In situ groundwater	Inactive wood preserving operation	Groundwater	NAPLS	Predesign; RFP for design to be issued Fall 1994	Federal lead/Fund Financed	Paul Sieminski 214-655-8503
6	American Creosote Works, Inc. (Winnfield Plant), LA (04/28/93)	In situ soil	Wood preserving	Soil (250,000 cy)	SVOCs (PCP, Creosote), PAHs	Design completed but not installed; Completion planned Fall 1994	Federal lead/Fund Financed; CDM Federal Programs (design contractor)	Bert Griswold 214-655-8502
6	Atchison/Santa Fe/Clovis, NM (09/23/88)	In situ soil	Railyard wastes (diesel spills)	Soil (28,600 cy), Sludge combined, 6 feet deep	PAHs (petroleum hydrocarbons, diesel fuel)	Operational; Completion planned end of 1996; Operation began 6/92	PRP lead/Federal oversight; Radian Corporation	Ky Nichols 214-665-6783
6	Oklahoma Refining Co., OK (06/09/92) See also Bioremediation (Ex Situ)	In situ soil	Petroleum refining and reuse	Soil (43,300 cy)	VOCs, Organics (LNAPLs)	In design; Phase 1 to be completed 4/95; Phase 2 to be completed 5/96	State lead/Fund Financed	Phillip Allen 214-665-8516

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (In situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
6	French Limited, TX (03/24/88)	Bioremediation (In Situ) In Situ Lagoon	Petrochemical	Soil and Sludge combined (300,000 cy)	VOCs, PAHs	Completed; Operational 1/92 - 12/93	PRP lead/Federal oversight	Judith Black 214-655-6735
7	People's Natural Gas, IA (09/16/91)	In situ soil; injection of nutrients and oxygenated water to treat both saturated and unsaturated soil	Coal gasification	Soil (18,500 cy)	VOCs (BTEX), PAHs	Design completed but not installed; pilot study underway; decision to expand the system will be made in Fall 1994	PRP lead/Federal oversight; BARR Engineering	Bill Bunn 913-551-7792
7	Pester Refinery Co., KS (09/30/92) See also In situ Flushing	In situ soil preceeded by in situ soil flushing	Refinery operation	Soil (70,000 cy)	PAHs (Benzo(a)anthracene, Chrysene)	Predesign	PRP lead/State oversight	Cathy Barret 913-551-7704 Rachel Miller 913-296-1676
8	Broderick Wood Products OU 2, CO (03/24/92) See also Bioremediation (Ex Situ)	In situ soil and in situ gw bioventing of soil & aquifer; solids following free product recovery and dewatering	Wood preserving	Soil 20 acres; 10 feet to rock	SVOCs (PCP), PAHs	In design; Design completion planned Fall 1994	Federal lead/Fund Financed; CH2M (prime contractor)	Armando Saenz 303-293-1532

Bioremediation (In situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
8	Burlington Northern (Somers Plant)*, MT (09/27/89) See also Bioremediation (Ex Situ)	In situ groundwater Carbon treatment aboveground; treatment followed by nutrient and pure oxygen addition prior to reinjection	Wood preserving	Groundwater 2 areas, 20 ft deep and 30 ft deep	SVOCs (Phenols), PAHs (Creosote)	Operational; Operational since May 1994; completion date unknown	PRP lead/Federal oversight; Remediation Technologies, Inc.	Jim Harris 406-449-5414 (ext. 260)
8	Idaho Pole Company*, MT (09/28/92) See also Bioremediation (Ex Situ), In situ Flushing	In situ groundwater; injection of oxygen and nutrients	Wood preserving	Groundwater down to 30 feet deep	SVOCs (PCP, PAHs)	Predesign	PRP lead/Federal oversight	Jim Harris 406-449-5414 (ext. 260)
8	Libby Groundwater Contamination*, MT (12/30/88) See also Bioremediation (Ex Situ)	In situ groundwater; Injection of H202 and Potassium tripolyphosphate	Wood preserving	Groundwater (40 - 80 ft deep)	VOCs (Benzene), SVOCs (PCP), PAHs (Creosote)	Operational; Completion planned 2001; Operation began in Spetember 1991	PRP lead/Federal oversight; Woodward-Clyde	Jim Harris 406-449-5414 (ext. 260) Bert Bledsoe (RSKERL) 405-332-2313
8	Montana Pole and Treating Plant, MT (09/21/93) See also Bioremediation (Ex Situ), In situ Flushing	In situ soil	Wood preserving	Soil (44,000 cy)	SVOCs (PCP, Dioxins, PAHs)	Predesign; In negotiation	In negotiation	Sara Weinstock 406-782-7415
8	Montana Pole and Treating Plant (Groundwater), MT (09/21/93)	In situ groundwater	Wood preserving	Groundwater	SVOCs (PCP, Dioxins, PAHs)	Predesign; In negotiation	In negotiation	Sara Weinstock 406-782-7415

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (In situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
9	Williams AFB, (OU2), AZ (12/30/92) See also Soil vapor extraction	Bioremediation In Situ; Bioventing	AFB, Flight Training Base	Soil (54,000 cy) down to 25 feet deep	VOCs (Dichlorobenzene, 1,2-DCA, Methylene Chloride), PAHs (TPH)	Being installed; Full-scale operation to start 1/95	USAF - IRP/ EPA and State Oversight; Earth Technologies	R. Mendoza 415-744-2407 William Harris (USAF) 602-988-6486
9	Hexcel, CA (09/21/93) See also Soil vapor extraction, Other Technologies	In situ soil	Manufacturing	Soil (quantity unknown), Groundwater	VOCs (PCE, Acetone, MEK, Benzene)	Predesign; PD completion planned Fall 1994	PRP lead/State oversight	Mark Johnson 510-286-0305
9	Koppers Company, Inc. (Oroville Plant), CA (04/04/90) See also Soil Washing	In situ soil	Wood preserving	Soil (110,000 cy) to a depth of 10 ft	SVOCs (PCPs), PAHs	Design completed but not installed; installation postponed until completion of removal action	PRP lead/Federal oversight; SBP Technologies	Fred Schauffler 415-744-2359
10	Eielson Air Force Base*, AK (09/29/92) See also Soil vapor extraction	In situ soil; Bioventing	Tactical air support installation Airplane fueling and maintenance	Soil (quantity unknown) down to 10 ft deep	VOCs (JP-4), SVOCs, PAHs (Petroleum Hydrocarbons, Diesel)	Operational	Federal Facility/EPA and State oversight; DERA; EA Engineering (Design)	Mary Jane Nearman 206-553-6642 Rielle Markey (AK) 907-451-2117 Capt. Max Gandy (Eielson AFB) 907-377-4361
10	Fairchild AFB, Priority 1 OU's (OU 2) FT-1, WA (07/14/93) See also Other Technologies	Bioremediation; In Situ Bioventing	Fire training area	Soil (quantity unknown)	VOCs (Benzene)	In design; Pilot test starting 5/94	USAF/Federal oversight; E.S. Inc.	Cami Grandinetti 206-553-8696

Chemical Treatment

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	JFD Electronics/Channel Master, NC (09/10/92)	Oxidation of cyanides followed by on-site s/s for metals	Solvent recovery	Soil and Sludge combined, (3,000 cy)	Inorganic cyanides	In design; Design completion planned Summer 1995	PRP lead/Federal oversight	McKenzie Mallary 404-347-7791

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Dechlorination

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
2	Myers Property, NJ (09/28/90) See also Soil Washing	Dechlorination	Pesticide manufacturing/use/ storage	Soil (48,000 cy), Sediments (500 cy)	SVOCs (Chlorobenzene), Biocides (DDT, DDE, DDD), Dioxins	In design; Design completion planned Spring 1996; Design concurrent with treatability studies	PRP lead/Federal oversight; Metcalf & Eddy	John Prince 212-264-1213
2	Wide Beach Development, NY (09/30/85)	Dechlorination with APEG using an anaerobic thermal process unit	Contaminated road dust, driveways, ditches	Soil (40,000 cy)	PCBs	Completed; Operational from 9/90 to 9/91	Federal lead/Fund Financed; SoilTech Inc. (subonctractor to Kimmins)	Herb King 212-264-1129
3	Saunders Supply Co, OU 1, VA (09/30/91) See also Thermal Desorption	Dechlorination	Wood preserving	Sludge (700 cy) K001 RCRA waste from a lagoon	SVOCs (PCP), Dioxins	In design; Design completion planned Spring 1995	Federal lead/Fund Financed	Andy Palestini 215-597-1286
4	Smith's Farm Brooks, OU 1*, KY (09/30/91) See also Thermal Desorption	Dechlorination (part of anaerobic thermal treatment)	Drum storage/ disposal	Soil (18,500 cy)	PCBs	Operational; Operation began in April 1994; completion planned October 1994	PRP lead/Federal oversight; Canonie (prime contractor), SoilTech (subcontractor)	Tony DeAngelo 404-347-7791
4	Helena Chemical, SC (09/08/93) See also Bioremediation (Ex Situ)	Dechlorination	Retail sales outlet for agricultural chemicals	Soil (quantity unknown)	VOCs (Diesel fuel), Biocides (DDT, Aldrin, Dieldrin, Chlordane, Toxaphene)	In design; Design completion planned Winter 1994	PRP lead/Federal oversight; Ensafe	Bernie Hayes 404-347-7791 Adrian Felder (SC) 803-734-5390

In situ Flushing

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
2	Lipari Landfill (OU 2)*, NJ (09/30/85)	Soil flushing Flushing of area within the slurry wall, including soil and wastes.	Industrial landfill, Municipal landfill	Soil (650,000 cy) 16 acres to a depth of 15 feet	VOCs (Bis-2-chloroethy lether, DCA, Dichloromethane), SVOCs (Phenol), Metals (Chromium, Lead, Nickel, Mercury)	Operational; Completion planned 1999	Federal lead/Fund Financed; AWD, Inc.	Fred Cataneo 212-264-9542
2	Vineland Chemical, OU 1 and OU 2, NJ (09/29/89) See also Soil Washing	Soil flushing Flushing lagoons using treated gw	Pesticide manufacturing/use/ storage	Soil (126,000 cy) to a depth of 15 feet in sandy soil	Metals (Arsenic)	In design; Design completion planned Winter 1995	Federal lead/Fund Financed; Malcolm Pirnie (Design)	Matthew Westgate 212-264-3406 Steve Hadel (USACE-Kansas City) 816-426-5221
2	Byron Barrel & Drum, NY (09/29/89)	Soil flushing	Drum storage/ disposal	Soil (5,200 cy), Groundwater	VOCs (TCE, DCE, TCA, Methyl Ethyl Ketone), Metals (Chromium, Lead)	Predesign; PD completion planned Fall 1994	PRP lead/Federal oversight	Eduardo Gonzales 212-264-5714
2	Pasley Solvents and Chemicals, Inc., NY (02/24/92) See also Soil vapor extraction	Soil flushing	Tank farm and chemical distribution facility	Soil (13,000 cy) down to 30 feet deep	SVOCs (Naphthalene)	In design; Negotiation with PRP is going on for new design.	Federal lead/Fund Financed; Ebasco (design)	Sherrel Henry 212-264-8675

In situ Flushing (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	Ciba-Geigy (MacIntosh Plant) OU 2, AL (09/30/91) See also Thermal Desorption	Soil flushing	Agriculture applications, Pesticide manufacturing/use/ storage, Other organic chemical manufacturing	Soil (quantity unknown)	VOCs (Benzene, Chloroform, Toluene), Biocides (DDD, DDT, DDE, BHCs, Diazinon, Chlorobenzilate), Metals (Lead)	Predesign; PD completion planned Winter 1995; Treatability studies ongoing; final decision on technology will be made late 1994	PRP lead/Federal oversight; CDM/FPC (Demolition/Design contractors)	Charles King 404-347-6262
4	Ciba-Geigy (MacIntosh Plant) OU 4, AL (07/14/92) See also Thermal Desorption	Soil flushing	Agriculture applications, Pesticide manufacturing/use/ storage, Other organic chemical manufacturing	Soil (quantity unknown)	VOCs (Chloroform, Toluene, Xylenes), Biocides (Atrazine, Diazinon, Prometryn, Simazine), Metals (Copper, Lead, Arsenic, Chromium, Iron slurry)	Predesign; Treatability studies ongoing; final decision on technologies will be made late 1994	PRP lead/Federal oversight	Charles King 404-347-6262
4	Peak Oil/Bay Drums OU 1, FL (06/21/93) See also Bioremediation (In Situ)	Soil flushing	Waste oil re-refinery	Soil (quantity unknown)	VOCs (PCE, Ethylbenzene), SVOCs (PAHs), Metals (Lead, Zinc, Chromium)	Predesign; PD completion planned Fall 1994	Federal lead/Fund Financed	David Abbot 404-347-2643

In situ Flushing (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	JADCO-Hughes, NC (09/27/90) See also Soil vapor extraction	Soil flushing Preceded by vacuum extraction using the same horizontal wells	Plastics manufacturing, Other organic chemical manufacturing, Other inorganic chemical manufacturing, Drum storage/ disposal, Municipal water supply	Soil (6,000 cy)	VOCs (TCE, Vinyl Chloride,Carbon Tetrachloride,Chlorofor, BTX), SVOCs (Dichlorobenzene, Trichlorobenzene)	In design; Design completion planned December 1994	PRP lead/Federal oversight; Conestoga-Rovers & Associates (prime contractor)	Michael Townsend 404-347-7791 Bruce Nicholson (NC) 919-733-2801
5	Ninth Avenue Dump, IN (06/30/89)	In situ Flushing of area inside slurry wall	Industrial landfill	Soil (64,000 cy), Groundwater	VOCs (TCE, BTEX)	Completed	PRP lead/Federal oversight; Fluor-Daniel	Bernard Schorle 312-886-4746
5	Rasmussen Dump, MI (03/28/91)	Soil flushing (flushing part of recycle of treated gw)	Industrial landfill, Paint/ink formation	Soil seepage (basin size unknown)	VOCs (Vinyl Chloride, Benzene)	In design; Design completion planned Fall 1994	PRP lead/Federal oversight; Woodward Clyde (prime contractor)	Ken Glatz 312-886-1434
6	Koppers/Texarkana*, TX (09/23/88) See also Soil Washing	Soil flushing with reinjection of treated water to 1 ft below surface	Wood preserving	Soil (19,400 cy) below 1 ft, treated by reinjected water	PAHs (Benzo(a)pyrene, Creosote), Metals (Arsenic)	In design	PRP lead/Federal oversight; ENSR (RD/RA contractor)	Ursula Lennox 214-655-6743
6	South Cavalcade Street*, TX (09/26/88) See also Soil Washing	Soil flushing with the same surfactants used for the soils treated with soil washing	Wood preserving	Soil (20,000 cy)	PAHs (Benzo(a)pyrene, Benzo(a)anthracene, Chrysene)	Predesign; Technology on hold pending remediation of groundwater	PRP lead/Federal oversight	Glenn Celerier 214-655-8523

In situ Flushing (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
7	Pester Refinery Co., KS (09/30/92) See also Bioremediation (In Situ)	Soil flushing followed by in situ bioremediation	Refinery operation	Soil (70,000 cy), Sludge (30,000 cy)	PAHs (Benzo(a)anthracene, Chrysene)	Predesign	PRP lead/State oversight	Cathy Barrett 913-551-7704 Marvin Glotzbach (KS) 913-296-2783
7	Lee Chemical, MO (03/21/91)	Soil flushing with 3 infiltration galleries; 10 ft x 50 ft each	Solvent recovery	Soil (30,000 cy) 20 ft to gw	VOCs (TCE)	Operational; Completion planned 1999; Operation began 5/94	PRP lead/State oversight; (no treatment contractor)	Steven Kinser 913-551-7728 Ron Redden (MO) 314-751-8393
8	Idaho Pole Company*, MT (09/28/92) See also Bioremediation (Ex Situ), Bioremediation (In Situ)	Soil flushing	Wood preserving	Soil (6,500 cy)	SVOCs (PCP, PAHs)	In design; Design completion planned Fall 1994	PRP lead/Federal oversight	Jim Harris 406-449-5414 (ext. 260)
8	Montana Pole and Treating Plant, MT (09/21/93) See also Bioremediation (Ex Situ), Bioremediation (In Situ)	Soil flushing	Wood preserving	Soil (44,000 cy)	SVOCs (PCP), Dioxins, PAHs	Predesign; In negotiation	In negotiation	Sara Weinstock 406-782-7415
10	Union Pacific Railroad Sludge Pit, ID (09/10/91)	Soil flushing	Railroad operations, cleaning and fueling	Soil (quantity unknown)	VOCs (PCE,TCE), PAHs (Petroleum hydrocarbons), Metals (Arsenic,Cadmium)	Predesign; Remedy being reconsidered	PRP lead/Federal oversight	Ann Williamson 206-553-2739 Clyde Cody (ID) 208-334-0556

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

In situ Flushing (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
10	United Chrome Products*, OR (09/12/86)	Soil flushing	Chrome plating facility	Soil (quantity unknown)	Metals (Chromium VI)	Operational; Operations began during Summer 1988 and will continue until GW standard is met.	PRP lead/Federal oversight; CH2MHill & subcontractors	Alan Goodman 503-326-3685

In situ Vitrification

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
5	Ionia City Landfill*, MI (09/29/89)	In situ Vitrification	Municipal landfill	Soil (5,000 cy) with debris, to a depth of 15 feet	VOCs (Methylene Chloride, TCA, Styrene, Toluene), Metals (Lead)	In design; Design completion planned Summer 1995	PRP lead/Federal oversight; Geosafe	Michael Gifford 312-886-7257
8	Wasatch Chemical*, UT (03/29/91) See also Bioremediation (Ex Situ)	In situ Vitrification consolidation of soil & waste in pond prior to treatment	Pesticide manufacturing/use/ storage, Other organic chemical manufacturing, Other inorganic chemical manufacturing	Soil, sludge, and solids combined to 5 feet deep (1,500 cy)	VOCs, SVOCs (Hexachloro-benzene, PCP), Biocides, Dioxins	Design completed but not installed; Installation planned Fall 1994: Project completion planned Spring 1995; awaiting vendor availability	PRP lead/Federal oversight; GeoSafe	Bert Garcia 303-293-1537

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Vapor Extraction

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
1	Kellogg-Deering Well Field, CT (09/29/89)	Soil vapor extraction	Solvent recovery, Industrial complex, illegal dumping of solvent was	Soil (quantity unknown)	VOCs (TCE, PCE, DCE, TCA, DCA, Vinyl Chloride)	In design; Design completion planned Fall 1994	PRP lead/Federal oversight; GZA Geoenviron-mental (Design)	Leslie McVickar 617-573-9689
1	Linemaster Switch Corporation, CT (07/21/93)	Soil vapor extraction	Electrical power switches manu. facility	Soil (quantity unknown)	VOCs (TCE)	Predesign	Federal lead/Fund Financed	Elise Jakabhazy 617-573-5760
1	Groveland Wells*, MA (09/30/88)	Soil vapor extraction (carbon absorption for air emissions)	Manufacturing	Soil (19,000 cy) to a depth of 25-30 feet	VOCs (TCE, Methylene Chloride, DCE)	Operational	PRP lead/Federal oversight; Terra Vac	Bob Leger 617-573-5734
1	Silresim, MA (09/19/91)	Soil vapor extraction	Chemical waste reclamation	Soil (137,000 cy)	VOCs (TCE, TCA, Carbon Tetrachloride, Chloroform, Styrene)	Being installed; Installation completion planned Winter 1994	Federal lead/Fund Financed	Mark Otis 617-573-5797
1	Wells G&H OU 1, MA (09/14/89)	Soil vapor extraction with air flushing	Drum storage/ disposal, Leaking UST and midnight dumping	Soil (7,400 cy) to a depth of 3 feet	VOCs (PCE, TCE)	Operational; OU 1 consists of 5 properties, the technolgy has become operational on some of the properties.	PRP lead/Federal oversight; Several contractors working on the site	Mary Garren 617-573-9613 Paula Fitzsimmons (MA) 617-223-5572

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
1	Union Chemical Co., OU 1, ME (12/27/90)	Soil vapor extraction	Solvent recovery, Paint stripping	Soil (10,000 cy)	VOCs (TCE,DCE,PCE,Xylene)	In design; Design completion planned Fall 1994	PRP lead/Federal oversight; Balsam Environmental/ VAPEX	Terrance Connelly 617-573-9638 Christopher Rushton (ME) 207-287-2651
1	Mottolo Pig Farm, NH (03/29/91)	Soil vapor extraction	Uncontrolled waste site	Soil (3,400 cy)	VOCs (TCE, TCA, Vinyl Chloride, DCA, DCE, Toluene, Ethylbenzene)	Operational; Completion planned Spring 1995; Operation started October 1993	Federal lead/Fund Financed; Metcalf & Eddy (prime contractor) OH Materials (subcontractor)	Roger Duwart 617-573-9628 Joe Donovan (NH) 603-271-2911
1	South Municipal Water Supply Well*, NH (09/27/89) See also Other Technologies	Soil vapor extraction ; Air sparging of gw	Ball bearing manufacturing	Soil (7,500 cy), Groundwater	VOCs (PCE, TCA, TCE)	Installed but not operational; Operation begins October 1994: Completion planned 2011	PRP lead/Federal oversight	Roger Duwart 617-573-9628 Tom Andrews (NH) 603-271-2910
1	Tibbetts Road*, NH (09/29/92)	Soil vapor extraction	Illegal dumping site, primarily painting wastes and solvents	Soil (50,000 cy) down to 20 feet	VOCs (PCE, TCE)	Predesign	In negotiation	Darryl Luce 617-573-5767 Tom Andrew (NH) 603-271-2010
1	Tinkham Garage (OU 1)*, NH (09/30/86)	Soil vapor extraction (carbon absorption for air emissions)	Illegal dumping site	Soil (9,000 cy)	VOCs (TCE, Chloroform, DCE, Vinyl chloride, Benzene)	In design; Operation scheduled to begin summer 1994	PRP lead/Federal oversight; Terra Vac	Jim DiLorenzo 617-223-5510

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
1	Peterson/Puritan Inc. (OU 1), RI (09/30/93) See also Other Technologies	Soil vapor extraction	Custom manufacturing facility Industrial and commercial area	Soil (quantity unknown)	VOCs (1,1,1 - TCA, PCE, TCE)	Predesign; EPA negotiating with PRP	State lead/Fund Financed	Dave Newton 617-573-9612 Leo Hellested (RI) 401-277-2797
1	Picillo Farm Site, RI (09/27/93)	Soil vapor extraction	Disposal area	Soil (131,000 cy)	VOCs, SVOCs, Biocides, PCBs	Predesign; EPA negotiating with PRP	Federal lead/Fund Financed	Anna Krasko 617-573-5749
1	Stamina Mills, RI (09/28/90)	Soil vapor extraction	Textile manufacturing	Soil (6,000 cy) to a depth of 12 feet	VOCs (DCE, TCE)	Predesign; PD completion planned January 1995	PRP lead/Federal oversight; Environmental & Safety Design Inc.	Neil Handler 617-573-9636 Mark Dennen (RI) 401-277-2797
2	A O Polymer, Soil treatment phase, NJ (06/28/91)	Soil vapor extraction (carbon adsorption for air emissions)	Polymer manufacturing	Soil (7,500 cy) to a depth of 30 feet	VOCs (TCE, TCA, Trichlorofluorome thane, Toluene, Ethylbenzene), SVOCs (Naphthalene, 4-methylphenol)	In design; Remedial construction will be completed Fall 1994	PRP lead/Federal oversight; Harding-Lawson	Rich Puvogel 212-264-9836
2	FAA Technical Center*, NJ (09/26/89) See also Bioremediation (In Situ)	Soil vapor extraction	Jet fuel tank farm	Soil (33,000 cy)	VOCs (BTEX), SVOCs (Chlorophenol, Phenol)	Being installed; Operation scheduled 1/95; completion scheduled for 2000 or later	Federal Facility, FAA lead; R.E. Wright (prime contractor)	Carla Struble 212-264-4595 Keith Buch (FAA) 609-485-6644

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
2	Garden State Cleaners, NJ (09/26/91)	Soil vapor extraction	Dry cleaners	Soil (300 cy) 25 ft deep; 3 feet by 10 feet	VOCs (PCE)	Operational; Operation began in June 1994	Federal lead/Fund Financed	Sharon Atkinson 212-264-1217
2	Naval Air Engineering Center, OU 23, NJ (09/27/93)	Soil vapor extraction	Fuel storage farm	Soil (3,500 cy)	VOCs, PAHs (TPH, Naphthalene)	In design; Design completion planned Fall 1994	Federal Facility/ Federal Oversight	Jeff Gratz 212-264-6667
2	South Jersey Clothing, NJ (09/26/91)	Soil vapor extraction	Dry cleaners, Clothing manufacturer	Soil (1,400 cy) to a depth of 25 feet	VOCs (TCE)	In design; Design completion planned Winter 1995	Federal lead/Fund Financed; USACE (design)	Sharon Atkinson 212-264-1217
2	Swope Oil & Chem Co., OU 2, NJ (09/27/91)	Soil vapor extraction Vacuum extraction.Bioventing (Not planned yet)	Chemical reclamation	Soil (253,000 cy) 2 acres, to a depth of 80 feet	VOCs (TCE, PCE, Toluene, Ethylbenzene, Xylene)	In design; Design completion planned Spring 1995	PRP lead/Federal oversight; Geraghty & Miller (design)	Joseph Gowers 212-264-5386
2	Applied Environmental Services, OU 1, NY (06/24/91) See also Bioremediation (In Situ), Other Technologies	Soil vapor extraction with air flushing with air sparging; area will be covered	Bulk petroleum and hazardous waste storage facility, fuel blending	Soil depth to gw averages 8 ft	VOCs (BTEX)	Design completed but not installed; Design completed in 3/94; construction to start in Summer of 1994	PRP lead/State oversight; Remediation Technologies, Inc.	Mel Hauptman 212-264-7681 John Grathwol (NY) 518-457-9280

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
2	Circuitron Corporation, OU 1, NY (03/29/91)	Soil vapor extraction	Electroplating	Soil (900 cy) to a depth of 30 ft	VOCs (TCA, PCE, TCE, DCA)	In design; Design completion planned Fall 1994	Federal lead/Fund Financed; ICF (design contractor)	Miko Fayon 212-264-4706
2	Genzale Plating Company, OU 1, NY (03/29/91)	Soil vapor extraction precedes excavation for off-site solidification	Electroplating	Soil (275 cy) to a depth of 30 ft	VOCs (TCE, TCA)	In design; Design completion planned Fall 1994	Federal lead/Fund Financed; Ebasco	Miko Fayon 212-264-4706
2	Mattiace Petrochemicals Company, OU 1, NY (06/27/91)	Soil vapor extraction	Organic chemicals blending	Soil (17,000 cy) to a depth of 40 feet	VOCs (PCE, TCE,, Benzene, Xylene)	Predesign; PD completion planned Fall 1994	Federal lead/Fund Financed	Edward Als 212-264-0522
2	Pasley Solvents and Chemicals, Inc., NY (02/24/92) See also In situ Flushing	Soil vapor extraction	Tank farm and chemical distribution facility	Soil (13,000 cy) down to 30 feet deep	VOCs (TCE, PCE, Benzene)	In design; Negotiation with PRP is going on for new design.	Federal lead/Fund Financed; Ebasco (design contractor)	Sherrel Henry 212-264-8675 Jim Bologna (NY) 518-459-3976
2	SMS Instruments (Deer Park), NY (09/29/89)	Soil vapor extraction with catalytic combustor for vapors	Military aircraft component overhauler	Soil (1,250 cy) to a depth of 25 feet	VOCs (TCE, Dichlorobenzene)	Completed; Operational from 4/92 to 12/93	Federal lead/Fund Financed; Four Seasons	Miko Fayon 212-264-4706
2	Vestal Water Supply 1-1, NY (09/27/90)	Soil vapor extraction	Industrial park	Soil (25,000 cy) Both areas = 25,000 cy, to 28 ft depth	VOCs (DCA, TCA, TCE, DCE)	In design; Design completion planned Summer 1994	Area 2 - Fund lead; Area 4 - PRP lead S.V.E	Ed Als 212-264-0522

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
2	Janssen Inc., PR (09/30/93)	Soil vapor extraction	Pharmaceutical Manufacturing	Soil (quantity unknown)	VOCs (Chloroform)	Being installed; Installation completion planned Fall 1994	Federal lead/Fund Financed	Adalberto Bosque 809-729-6951
2	Upjohn Manufacturing Co., PR (09/30/88)	Soil vapor extraction	Industrial facility, chemical leak	Soil (quantity unknown)	VOCs (Carbon Tetrachloride, Acetonitrile)	Completed; Operational 1/83 - 3/88	PRP lead/Federal oversight; Terra Vac	Alison Hess 212-264-6040
3	Delaware Sand and Gravel, DE (09/30/93) See also Bioremediation (In Situ)	Soil vapor extraction	Landfill site drum disposal area	Soil (50,000 cy)	VOCs (Benzene, TCE, PCE, Methylene Chloride)	Predesign; In negotiaton	PRP lead/Federal oversight	Eric Newman 215-597-0910
3	Bendix, PA (09/30/88)	Soil vapor extraction with air flushing	Aircraft instrumentation manufacturing	Soil (33,000 cy) to a depth fo 10 feet	VOCs (PCE, TCE, Vinyl Chloride)	Predesign; Treatability study completed and being reviewed	PRP lead/Federal oversight; ERM, Inc.	Jim Harper 215-597-6906
3	Cryochem, OU 3, PA (09/30/91)	Soil vapor extraction	Machine shops, Metal fabrication	Soil (70 cy) up to 4 ft deep	VOCs (TCA, TCE, PCE, DCA, DCE)	In design; Design completion planned Summer 1995	Federal lead/Fund Financed; CH2M Hill	Joe McDowell 215-597-8240
3	Lord-Shope Landfill*, PA (06/29/90)	Soil vapor extraction (method to be determined in design)	Industrial landfill	Soil (270,000 cy) to a depth of 30 feet	VOCs (PCE, TCE, Vinyl Chloride, Alcohols, n-butanol), SVOCs (Ketones)	Design completed but not installed	PRP lead/Federal oversight; Eckenfelder	Dave Turner 215-597-3218

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
3	Raymark*, PA (12/30/91)	Soil vapor extraction	Multi-source metal fabrication facility	Soil (quantity unknown), Solids bedrock	VOCs (TCE, PCE, 1,2-DCE)	Operational; since May 1994	Federal lead/Fund Financed	Harry Harbold 215-597-1101
3	Saegertown Industrial Area Site, PA (01/29/93) See also Other Technologies	Soil vapor extraction	Industrial park (Lord Corp. property)	Soil (quantity unknown)	VOCs (TCE, TCA)	In design; Design completion planned Fall 1995	PRP lead/Federal oversight	Steve Donohue 215-597-3166 Bob Kimball 814-332-6075
3	Tyson's Dump*, PA (03/31/88)	Soil vapor extraction with air flushing (The system has been modified during operations)	Abandoned septic and chemical waste disposal site	Soil (30,000 cy) with some DNAPL,to a depth of 30 feet	VOCs (Benzene, Toluene, Xylene), SVOCs (Trichloro-propane)	Operational; since 11/88; completion date unknown	PRP lead/Federal oversight; Terra Vac	Eugene Dennis 215-597-3153
3	Arrowhead Associates/Scovill, OU 1, VA (09/30/91)	Soil vapor extraction with air flushing	Electroplating	Soil (1,000 cy) depth unknown	VOCs (TCE, PCE)	Predesign; In negotiation with PRP	PRP lead/Federal oversight; ICF Kaiser	Ron Davis 215-597-1727
3	Defense General Supply Center, OU 5*, VA (03/25/92)	Soil vapor extraction (one extraction well)	Cleaning and repainting of combat helmets and gas cylinders	Soil (1,000 cy)	VOCs (PCE, TCE)	Completed; Consisted of pilot study 12/1/92-12/11/92; after which soil samples showed no further contamination	Federal Facility DLA Lead/Federal oversight; Engineering-Science	Jack Potosnak 215-597-2317 Bill Sadington (DGSC) 804-279-3781
4	Hollingsworth Solderless, FL (04/10/86)	Soil vapor extraction	Electroplating	Soil (60 cy)	VOCs (TCE, Vinyl chloride)	Completed; Operational from 1/91 to 7/91	Federal lead/Fund Financed; Ebasco	John Zimmerman 404-347-2643

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	Robins AFB, Landfill and Sludge Lagoon, OU 1, GA (06/28/91)	Soil vapor extraction	Federal facility, sludge from an industrial waste water treatment plant	Soil (15,000 cy) combined, to a depth of 8 feet, Sludge (quantity unknown)	VOCs (TCE, PCE, Vinyl Chloride, Carbon Tetrachloride)	Predesign; PD completion planned Summer 1994	Federal Facility, USAF Lead/Federal Oves	Liz Wilde 404-347-3016
4	Charles Macon Lagoon, Lagoon #7, OU 1, NC (09/30/91)	Soil vapor extraction with air flushing	Petroleum refining and reuse, Drum storage/disposal, Waste oil recycler	Soil (1,300 cy) combined	VOCs (PCE)	In design; Design completion planned Summer 1994	PRP lead/Federal oversight; RMT	Giezelle Bennett 404-347-7791 David Lown (NC) 919-733-2801
4	JADCO-Hughes, NC (09/27/90) See also In situ Flushing	Soil vapor extraction with horizontal wells Followed by in situ flushing with same ports	Plastics manufacturing, Other organic chemical manufacturing, Other inorganic chemical manufacturing, Drum storage/ disposal, Municipal water supply	Soil (6,000 cy)	VOCs (Carbon tetrachloride, Chloroform, Vinyl chloride, BTX), SVOCs (Dichlorobenzene, Trichlorobenzene)	In design; Design completion planned December 1994	PRP lead/Federal oversight; Conestoga-Rover s & Associates (prime contractors)	Micheal Townsend 404-347-7791 Bruce Nicholson (NC) 919-733-2801
4	USMC Camp Lejeune Military Base, OU 2, NC (09/24/93)	Soil vapor extraction	Drum storage/ disposal	Soil (16,500 cy)	VOCs (DCE, PCE, TCA, Vinyl Chloride)	In design; Design completion planned Fall 1994	USMC Lead/Federal Oversight	Gena Townsend 404-347-3016
4	Medley Farm, OU 1, SC (05/29/91)	Soil vapor extraction	Other organic chemical manufacturing, Rubber manufacturing, Drum storage/ disposal	Soil (50,000 cy) maximum depth 60ft	VOCs (DCA, DCE, TCA, TCE, PCE, Methylene Chloride), SVOCs (Phthalates)	Design completed but not installed; Installation completion planned for January 1995	PRP lead/Federal oversight; RMT, Inc.	Ralph Howard 404-347-7791 Richard Haynes (SC) 803-734-5487

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	SCRDI Bluff Road, SC (09/12/90)	Soil vapor extraction with air flushing	Drum storage/ disposal, Solvent recovery	Soil (45,000 cy) to a depth of 12 feet	VOCs (TCA, TCE, PCA, PCE, DCA, DCE, MEK, Chlorobenzene, BTEX)	In design; Design completion planned Summer 1994	PRP lead/Federal oversight; ERM DeMaximus to organize all PRPs contractors	Steve Sandler 404-347-7791
4	Carrier Air Conditioning*, TN (09/03/92)	Soil vapor extraction with air flushing	Manufacturer of heating and air conditioning units	Soil (76,500 cy)	VOCs (TCE)	Design completed but not installed; Design-completion planned Fall 1994	PRP lead/Federal oversight; Environmental Safety & Designs, Inc.	Beth Brown 404-347-7791
5	Acme Solvent Reclaiming, Inc. OU 3 & OU 6, IL (12/31/90) See also Thermal Desorption	Soil vapor extraction with air flushing for OU 6	Industrial landfill, Municipal water supply	Soil (quantity unknown)	VOCs (DCA, TCA, DCE, TCE, PCE, Vinyl Chloride, Benzene)	In design; Design completion planned Summer 1994	PRP lead/Federal oversight; Harding/Lawson	Deborah Orr 312-886-7576
5	American Chemical Services*, IN (09/30/92) See also Thermal Desorption	Soil vapor extraction with air flushing bioenhancement for SVOCs;air flushing w/vertica wells	Other organic chemical manufacturing, Solvent recovery	Soil (100,000 cy) 15 to 20 ft deep	VOCs, PCBs	Predesign; Schedule pending completion of negotiation	In negotiation	Bill Bolen 312-353-6316
5	Enviro. Conservation and Chemical (ROD Amendment), IN (06/07/91)	Soil vapor extraction with air flushing	Chemical recycler (solvents)	Soil (quantity unknown)	VOCs (Toluene, Ethylbenzene, Xylene), SVOCs (Dichlorobenzene, Phenol), Organics (BNAs)	In design; Design completion planned for Fall 1995	PRP lead/Federal oversight	Karen Vendl 312-886-4739

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
5	Fisher Calo Chem, IN (08/07/90)	Soil vapor extraction	Municipal water supply	Soil (29,500 cy)	VOCs (PCE, DCA, TCA)	In design; Design completion planned Summer 1995	PRP lead/Federal oversight; Connestoga Rovers - Prime	Jeff Gore 312-886-6552
5	MIDCO I, IN (06/30/89)	Soil vapor extraction	Industrial landfill	Soil (10,000 cy) to a depth of 4 - 8 feet	VOCs (TCE, Dichloromethane, Chlorobenzene, 2-Butanone, BTX), SVOCs (Phenols), PAHs	Predesign; PD completion planned Winter 1994; Implementation planned for 1996	PRP lead/Federal oversight; ERM Northcentral-prime	Richard Boice 312-886-4740
5	MIDCO II, IN (06/30/89)	Soil vapor extraction	Drum storage/ disposal	Soil (12,200 cy)	VOCs (Methylene chloride, TCE, 2-Butanone, Toluene)	Predesign; PD completion planned Winter 1996; Bench-scale treatability study is underway	PRP lead/Federal oversight; ERM Northwest-prime	Rich Boice 312-886-4740
5	Main Street Well Field, IN (03/29/91)	Soil vapor extraction with horizontal wells	Solvent recovery, Water supply contamination from many sources	Soil (22,000 cy) to a depth of 10 feet	VOCs (TCE)	In design; East site (60% design completion by June 1, 1993)/ West site (95 % design in progress)	PRP lead/Federal oversight; Geraghty & Miller	Deborah Orr 312-886-7576

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
5	Seymour Recycling, IN (09/30/87) See also Bioremediation (In Situ)	Soil vapor extraction (No need for emissions treatment)	Chemical waste management and incineration	Soil (200,000 cy) 12 acres to a depth of 10 feet	VOCs (TCA, Carbon tetrachloride, PCE, TCE, Vinyl chlorie, Benzene)	Operational; Completion planned Spring 1995	PRP lead/Federal oversight; Canonie Engineering (installation), Geraghty & Miller (operation)	Jeff Gore 312-886-6552
5	Wayne Waste Reclamation, IN (03/30/90)	Soil vapor extraction with air flushing	Municipal landfill, Oil reclamation	Soil (300,000 cy) 10 acres to a depth of 20 feet	VOCs (TCE, DCE, Vinyl chloride, BTEX)	Design completed but not installed; Design completed Feb 2/94	PRP lead/Federal oversight; Warzyn, Inc.	Duane Heaton 312-886-6399
5	Chem Central, MI (09/30/91)	Soil vapor extraction (vapor treatment through carbon)	Chemical packaging and distribution	Soil (6,200 cy) to 8 ft deep	VOCs (DCE, TCE, TCA, BTEX), SVOCs (Naphthalene, 2-methyl naphthalene)	In design; Design completion planned Summer 1994	PRP lead/Federal oversight; WW Engineering & Science	Colleen Hart 312-353-8752
5	Clare Water Supply, MI (09/16/92)	Soil vapor extraction with horizontal wells air flushing with vertical wells	Industrial area with above/below ground tanks--multisource groundwater site	Soil (54,800 cy) vadose zone & dewatered area to 25 ft deep	VOCs (TCE, DCE, Vinyl chloride, BTEX)	Predesign; Design planned to begin Spring 1994	Federal Lead/ PRP Funded; Seacore Environmental Engineering	Jon Peterson 312-353-1264
5	Electro-Voice, OU 1, MI (06/23/92)	Soil vapor extraction	Audio equipment manufacturer	Soil (2,100 cy) down to 50 feet	VOCs (TCE, PCE, Vinyl chloride), PAHs	Predesign; PD completion planned Spring 1994	PRP lead/Federal oversight; Fishbeck, Thompson, Carr, & Huber	Eugenia Chow 312-353-3156

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
5	Kysor of Cadillac Industrial*, MI (09/29/89)	Soil vapor extraction	Machine shops, Truck parts manufacturing	Soil (13,200 cy)	VOCs (TCE, Xylene, Toluene, Ethylbenzene)	In design; Design completion planned Fall 1994	PRP lead/Federal oversight; Fishbeck,Thompson,Carr,& Huber	Leah Evison 312-886-4696
5	Peerless Plating, MI (09/21/92)	Soil vapor extraction with horizontal wells	Electroplating	Soil (6,500 cy) depth to 7 feet	VOCs (1,2-DCE, TCE, Benzene, Ethylbenzene)	In design; Design completion planned December 1994	Federal lead/Fund Financed; PRC Environmental Management, Inc.	Tom Pay 312-886-5991
5	Springfield Township Dump, MI (09/29/90)	Soil vapor extraction	Industrial landfill	Soil (28,000 cy)	VOCs (TCE, TCA, Chlorobenzene, Toluene)	In design; negotiating with PRP	PRP lead/Federal oversight	Mary Lou Martin 312-353-9660
5	Sturgis Municipal Well Field, MI (09/30/91)	Soil vapor extraction	Solvent recovery	Soil Area and depth unknown, < 200 ft. deep	VOCs (TCE, PCE, TCA)	Predesign; PD completion planned Fall 1994	State lead/Fund Financed	Terese Van Donsel 312-353-6564 Steve Padovani 312-353-6755
5	ThermoChem, Inc. OU 1, MI (09/30/91)	Soil vapor extraction with air flushing ; May include biological enhancement	Recycling facility for organic solvents.	Soil (50,000 cy) to a depth of 17 - 32 feet	VOCs (PCE, TCE, Ethylbenzene, Xylene)	In design	Federal lead/Fund Financed; ACOE (Design)	Jim Hahnenberg 312-353-4213

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
5	Verona Well Field (Thomas Solvent/Raymond Road)*, MI (08/12/85)	Soil vapor extraction (with Nitrogen sparging during part of operation)	Municipal water supply	Soil (35,000 cy) one half acre to a depth of 18 feet	VOCs (Dichloromethane, Chloroform, Carbon Tetrachloride, BTEX, Vinyl chloride), SVOCs (Napthalene)	Completed; Operational from 3/88 to 5/92	Federal lead/Fund Financed; Terra Vac (subcontractor to CH2M Hill)	Margaret Guerriero 312-886-0399
5	Verona Well Field, OU 2, MI (06/28/91)	Soil vapor extraction Augmentation with air flushing is being considered	Machine shops, Municipal water supply	Soil (30,000 cy)	VOCs (PCE, TCA, Toluene)	Operational	PRP lead/Federal oversight; Geraghty & Miller (Prime), Maumee Bay (Remedial subcontractor)	Margaret Guerriero 312-886-0399
5	Long Prairie Groundwater Contamination, MN (06/27/88)	Soil vapor extraction with air flushing followed by GAC for off-gas	Dry cleaners	Soil (3,600 cy) to a depth of 15 feet	VOCs (DCE, PCE, TCE, Vinyl chloride)	Design completed but not installed; Installation to begin Spring 1995	State lead/Fund Financed	Jan Bartlett 312-886-5438 Maureen Johnson (MN) 612-296-7353
5	Miami County Incinerator, OH (06/30/89)	Soil vapor extraction with air flushing Treatment of off-gas determined in design	Municipal landfill, Surface impoundment	Soil and solids combined (98,000 cy)	VOCs (TCE, PCE, Toluene)	In design; Design completion planned Spring 1995	PRP lead/Federal oversight; Connestogo Roveis-Prime	Anthony Rutter 312-886-8961

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
5	Pristine (ROD Amendment)*, OH (03/30/90) See also Thermal Desorption	Soil vapor extraction with horizontal trenches down to 15 feet	Industrial waste treatment facility	Soil (19,400 cy) 3 acres and 15 feet deep	VOCs (Chloroform, DCA, PCE, TCE, Benzene), SVOCs (Phenol)	Being installed; installation to be completed late 1994; will operate 7-10 years	PRP lead/Federal oversight; Canonie (installation)	Thomas Alcamo 312-886-7278
5	Skinner Landfill (OU2), OH (06/04/93)	Soil vapor extraction	Sanitary landfill and buried industrial waste Lagoon	Soil (quantity unknown)	VOCs (Toluene,Xylene, TCA)	Predesign; PD completion planned Summer 1995; evaluating technical feasibility	PRP lead/Federal oversight	Bruce Sypniewski 312-886-6189
5	Zanesville Well Field, OH (09/30/91) See also Soil Washing	Soil vapor extraction with horizontal wells followed by excavation and soil washing for metals	Solvent recovery, Auto parts manufacturing	Soil (36,000 cy)	VOCs (TCE, DCE)	In design; Design completion planned Fall 1994	PRP lead/Federal oversight	Dave Wilson 312-886-1476 FTS-886-1476
5	City Disposal Corporation Landfill, WI (09/28/92)	Soil vapor extraction	Industrial landfill, Municipal landfill	Soil (quantity unknown) quantity	VOCs (Tetrahydrofuran)	Predesign; PD completion planned Fall 1994	PRP lead/Federal oversight; Rust Environmental (prime contractor)	Russ Hart 312-886-4844 Mike Schmoller (WI) 608-275-3303
5	Hagen Farm Source Control OU, WI (09/17/90)	Soil vapor extraction	Industrial and municipal waste disposal	Soil (67,000 cy)	VOCs (Vinyl chloride, 2-Butanone, BTEX), Organics (Tetrahydrofuran)	Operational; Completion planned Summer 1996	PRP lead/Federal oversight; Warzyn-Prime	Steve Padovani 312-353-6755

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
5	Muskego Sanitary Landfill, Interim Action OU 1, WI (06/12/92)	Soil vapor extraction	Industrial landfill, Municipal landfill	Soil (300 cy) approximately 1 acre down to 15 ft deep	VOCs (Vinyl Chloride, 1,2-DCA, Methylene Chloride, BTEX)	Design completed but not installed; Installation planned Summer 1994	PRP lead/Federal oversight; Rust (Design)	Bill Haubold 312-353-6261
5	Wausau Groundwater Contamination, WI (09/29/89)	Soil vapor extraction Off-Gas Treatment	Machine shops, Bulk chemical distribution	Soil (1,300 cy) to a depth of 30 feet	VOCs (TCE, DCE, PCE)	Operational; Completion planned Summer 1995	PRP lead/Federal oversight; Hydrogeo-Chem (sub to Conestoga-Rovers & Associates)	Margaret Guerriero 312-886-0399
6	Prewitt Abandoned Refinery, NM (09/30/92) See also Bioremediation (Ex Situ), Other Technologies	Soil vapor extraction with Air Sparging	Crude oil refinery	Soil (quantity unknown)	Organics (NAPLs)	Predesign	PRP lead/Federal oversight	Monica Chapa-Smith 214-655-6780
6	Petro-Chemical Systems, Inc., OU 2, TX (09/06/91) See also Other Technologies	Soil vapor extraction with air flushing and air sparging of groundwater	Petroleum refining and reuse	Soil (300,000 cy) to a depth of 30 feet	VOCs (BTEX), SVOCs (Naphthalene)	Predesign; PD completion planned Summer 1995	PRP lead/Federal oversight	Chris Villareal 214-655-6758
7	Chemplex (OU 2), IA (05/12/93)	Soil vapor extraction	Landfill	Soil (350,000 cy)	VOCs (Benzene, TCE)	Predesign; Negotiations with PRPs ongoing	Federal lead/Fund Financed	Nancy Johnson 913-551-7703

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
7	McGraw Edison, IA (09/24/93)	Soil vapor extraction	Former manufacturing unit	Soil (quantity unknown)	VOCs (TCE)	Predesign; Unilateral Order for RD/RA is prepared	Federal lead/Fund Financed	Pauletta France 913-551-7701
7	Coleman Operable Unit 29th and Mead, KS (09/29/92)	Soil vapor extraction	Formerly vehicle manufacturing, currently heating, air conditioning equipment manufacturing	Soil (2,000,000 cy)	VOCs (TCE, 1,1,1-TCA, DCE, Vinyl chloride, Toluene)	Predesign; PD completion planned Fall 1994; Soil vapor system already in place. ROD calls for expansion of the system	PRP lead/Federal oversight; Groundwater Technologies, Inc.	Ken Rapplean 913-551-7769
7	Hastings GW Contamination (Colorado Ave)*, NE (09/28/88)	Soil vapor extraction	Industrial metal finishing/cleaning	Soil (42,700 cy)	VOCs (PCE, TCE, DCE, TCA)	In design; Design completion planned Fall 1994	PRP lead/Federal oversight; ENSR (design contractor)	Darrel Sommerhauser 913-551-7711 Richard Schlenker (NE) 402-471-3388
7	Hastings GW Contamination (Far-Mar Co.)*, NE (09/30/88)	Soil vapor extraction	Former grain storage area (fumigants)	Soil targeting layers at 35 ft and 110 ft	VOCs (Carbon tetrachloride, Ethylene dibromide)	In design; Design completion planned Fall 1994	PRP lead/Federal oversight; Burns & McDonald	Susan Hoff 913-551-7786
7	Hastings GW Contamination, Well No. 3*, NE (09/26/89)	Soil vapor extraction	Former grain storage area (fumigants)	Soil 1 acre down to 120 feet deep	VOCs (Carbon tetrachloride)	Completed; Operational from 7/92 to 5/93	Federal lead/Fund Financed; Morrison Knudsen	Diane Easley 913-551-7797

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
7	Lindsay Manufacturing, NE (09/28/90)	Soil vapor extraction with air flushing will address hot spots only	Electroplating, Galvanized pipes for irrigation systems	Soil targeting a depth of 25 - 40 feet	VOCs (DCA, DCE, TCE, PCE)	In design; Design completion planned Summer 1994	PRP lead/Federal oversight; Dames & Moore	Cecelia Tapla 913-551-7733
7	Waverly Groundwater Contamination, NE (09/26/90)	Soil vapor extraction	Grain storage (fumigants)	Soil (160,000 cy) up to 240,000 cy(5 acres, 20-30 ft deep)	VOCs (Carbon tetrachloride, Chloroform)	Operational; Completion planned 2001; operational since 2/88	USDA Lead/Federal Oversight	Jeff Weatherford 913-551-7695 Mary Hansen (Argonne National Lab) 708-972-4938
8	Chemical Sales Company, OU 1*, CO (06/27/91)	Soil vapor extraction with air flushing will recirculate treated emissions	Chemical sales and distribution, spillage at tank farm	Soil (360,000 cy) to 35 ft deep	VOCs (PCE, TCE)	In design; Design completion planned Summer 1994	PRP lead/Federal oversight; ENSR	Jim Berkley 303-293-1817
8	Martin Marietta (Denver Aerospace), CO (09/24/90) See also Thermal Desorption	Soil vapor extraction	Aerospace equipment manufacturer - bulk storage facility	Soil Less than one acre, depth unknown	VOCs (TCE)	In design; Design completion planned Summer 1994	PRP/State oversite under RCRA; Geraghty & Miller	George Dancik 303-293-1506 Charles Johnson 303-692-3348
8	Rocky Flats OU 2, Interim Remedial Action Plan, CO (08/10/92)	Soil vapor extraction	Former nuclear weapons research and development, production, and plutonium reprocessing complex	Soil (25,000 cy)	VOCs (TCE, PCE, Carbon tetrachloride)	Operational; Completion planned Summer 1995	DOE Lead/Federal Oversight DOE ERP; Woodward Clyde, Roy F. Weston, Layne Environmental	Bill Frazier 303-294-1081 Scott Grace (Rocky Flats) 303-966-7199

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
8	Rocky Mountain Arsenal OU 18, interim response, CO (02/26/90)	Soil vapor extraction with air flushing	Motor pool area	Soil (70,000 cy) 100 feet radius and 60 feet deep	VOCs (TCE, Ethylbenzene, Toluene)	Completed; Operational from 7/91 to 12/91	U. S. Army lead; Roy F. Weston, Ebasco, Harding Lawson, Woodward Clyde	Stacey Eriksen 303-294-1083 James Smith (Rocky Mtn Arsenal) 303-289-0249
8	Sand Creek Industrial OU 1*, CO (09/29/89)	Soil vapor extraction	Pesticide manufacturing/use/ storage, Refinery	Soil (38,000 cy)	VOCs (TCE, PCE, Methylene chloride, Chloroform)	Operational; Completion planned Fall 1994; Removed 70 tons to date	Federal lead/Fund Financed; OHM	Erna Acheson 303-294-1971
8	Utah Power and Light/American Barrel, UT (07/07/93)	Soil vapor extraction	Coal gasification	Soil (15,000 cy)	VOCs (Styrene), PAHs (Naphthalene)	Predesign; PD completion planned Spring 1995	PRP lead/Federal oversight	David Ostrander 303-293-1530
9	Hassayampa Landfill*, AZ (08/15/92)	Soil vapor extraction	Industrial landfill	Soil Approximately 10 acres	VOCs (1,1-DCE, 1,1,1-TCA, 1,2-DCE, 1,1-DCA, TCE, 1,2-DCB)	In design; Design completion planned Spring 1995; Pilot-scale study completed	PRP lead/Federal oversight; Conestoga-Rover s, Errol L. Montgomery & Ass., Inc.	Robert Riccio 415-744-2369
9	Indian Bend Wash Area, AZ (09/27/93)	Soil vapor extraction	Dry cleaners, Eletroplating, Industrial Landfill	Soil (quantity unknown)	VOCs (TCE, PCE, DCE, 1,1,1-TCA)	In design	Federal lead/Fund Financed; CH2M HILL	Emily Roth 415-744-2367 Jeff Dhont 415-744-2363 Winifred Au (AZ) 510-251-2888 (Ext.2126)

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
9	Indian Bend Wash, South Area, OU 1, AZ (09/12/91)	Soil vapor extraction May vary technology at different facilities within	Dry cleaners, Electroplating, Industrial landfill, Municipal landfill	Soil maximum depth - 90 ft	VOCs (PCE, TCE, TCA)	In design; Pilot project under the Superfund Accelerated Cleanup Model initiative, schedules may vary by unit	PRP lead/Federal oversight; mixed funding	Jeff Dhont 415-744-2363
9	Motorola 52nd Street, AZ (09/30/88)	Soil vapor extraction	Manufacturing facility	Soil 60 ft radius to a depth of 25 feet	VOCs (TCA, TCE, DCE, PCE,, Ethylbenzene)	In design; Design completion planned 1995; Pilot system operational but full scale technology still being evaluated	PRP lead/State oversight; Dames and Moore	Fred Schauffler 415-744-2359 Jeff Kulon (AZ) 602-207-4181 Hotline 602-207-4360
9	Phoenix-Goodyear Airport Area (North & South Fac), AZ (09/26/89)	Soil vapor extraction	Defense related manufacturing	Soil (271,200 cy) North: 1,200 cy; South: 270,000 cy, 60 ft deep	VOCs (DCE, TCE, MEK, Acetone)	Operational	PRP lead/Federal oversight; Metcalf & Eddy - South Area, Malcome Pirnie - North Area	Craig Cooper 415-744-2370
9	Williams AFB, (OU2), AZ (12/30/92) See also Bioremediation (In Situ)	Soil vapor extraction Bioenhancement	AFB, Flight Training Base	Soil (54,000 cy)	VOCs (Benzene 4, Dichlorobenzene, 1,2-DCA Ethyl Benzene), SVOCs	Operational; Operation began 3/94	USAF (EPA Oversite); Earth Technologies	Raman Mendoza 415-744-2407 Dr.William L. Harris (USAF) 602-988-6486

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
9	Fairchild Semiconductor (San Jose)*, CA (03/20/89)	Soil vapor extraction with air flushing	Semiconductor manufacturing	Soil (42,000 cy)	VOCs (TCA, 1,1-DCE, Freon-113, Isopropyl alcohol, PCE), Xylene)	Completed; operational from 1/89 to 5/90	PRP lead/State oversight; Canonie Engineering	Helen McKinley 510-744-1889 Steve Hill (CA) 510-286-0433
9	Fairchild Semiconductor/MTV-I*, CA (06/09/89)	Soil vapor extraction	Semiconductor manufacture and metal finisher	Soil (quantity unknown)	VOCs (TCE, PCE, Vinyl Chloride, DCA, DCE, Freon), SVOCs (Phenol)	Design completed but not installed; Installation planned October 1994	PRP lead/Federal oversight; Canonie Engineering	Elizabeth Adams 415-744-2235 James Boarer (Canonie) 415-744-2231 Thomas Jones (Fairchild) 415-960-0822
9	Fairchild Semiconductor/MTV-II*, CA (06/30/89)	Soil vapor extraction	Semiconductor manufacturing, Metal finishing facility	Soil (50,000 cy)	VOCs (TCE, PCE, Vinyl Chloride, DCA, DCE, Freon), SVOCs (Phenol)	Design completed but not installed; Installation planned October 1994	PRP lead/Federal oversight; Canonie Engineering	Elizabeth Adams 415-744-2235 James Boarer (Canonie) 415-960-1640 Thomas Jones (Fairchild) 415-960-0822
9	Hexcel, CA (09/21/93) See also Bioremediation (In Situ), Other Technologies	Soil vapor extraction with air flushing	Manufacturing	Soil (quantity unknown)	VOCs (PCE, Acetone, MEK, Benzene)	Predesign; PD completion planned Fall 1994	PRP lead/State oversight	Mark Johnson 510-286-0305
9	IBM (San Jose)*, CA (12/15/88)	Soil vapor extraction	Computer manufacture	Soil (24,000 cy)	VOCs (TCA, Acetone, Freon, Isopropyl Alcohol, Xylenes)	Operational; Completion planned Spring 2001	PRP lead/State oversight; Terra Vac	Steve Hill (CA) 510-286-0433

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
9	Intel, Mountain View*, CA (06/09/89)	Soil vapor extraction	Semiconductor manufacturing	Soil (3,000 cy)	VOCs (TCE, PCE, Vinyl chloride, DCA, DCE, Freon), SVOCs (Xylene)	In design; Operation planned Spring 1995	PRP lead/Federal oversight; Weiss Associates	Elizabeth Adams 415-744-2235 Eric Madera 408-522-7048 Michael Maley (CA) 510-450-6159
9	Intersil, CA (09/27/90)	Soil vapor extraction	Semi conductor manufacturing	Soil (quantity unknown)	VOCs (TCE, 1,1,1-TCA, Xylene)	Completed	State lead/Fund Financed	Marie Lacey 415-744-2234 Roshy Mozafar (CA) 510-286-1041
9	Intersil/Siemens, CA (09/27/90)	Soil vapor extraction	Semiconductor manufacturing	Soil (quantity unknown)	VOCs (TCE, 1,1,1-TCA, Xylene)	Operational; Ongoing at Siemens, completed at Intersil Fall 1993	State lead/Fund Financed; Levine-Fricke (Siemens)	Marie Lacey 415-744-2234 Steve Morse (CA) 510-286-0304 Roshy Mozafar 510-286-1041
9	Lawrence Livermore National Laboratory, CA (07/15/92)	Soil vapor extraction	Research and development facility	Soil (quantity unknown)	VOCs (Fuel hydrocarbons)	In design	DOE lead/Federal oversight	Mike Gill 415-744-2383
9	Lorentz Barrel and Drum (OU 1), CA (08/26/93)	Soil vapor extraction	Drum recycling business	Soil (50,000 cy)	VOCs	Predesign; Design to begin Summer 1994	Federal lead/Fund Financed; URS	Darrin Swartz-Larson 415-744-2233

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
9	Monolithic Memories/AMD - Arques, Subunit 2, CA (09/11/91)	Soil vapor extraction	Semiconductor manufacturing	Soil (3,400 cy)	VOCs (PCE, TCE, TCA), PAHs	Operational; Completion planned Fall 1996; Started operation in Spring 1993	State lead/Fund Financed; Pacific Environmental Group	Cecil Felix (CA) 510-286-1249
9	National Semiconductor (Monolithic Memories), CA (09/11/91)	Soil vapor extraction	Semiconductor manufacturing	Soil (quantity unknown)	VOCs (PCE, DCE, Toluene, Ethylbenzene, Xylene), SVOCs	Operational; Completion planned Fall 1996	State lead/Fund Financed; Harding Lawson & Associates	Cecil Felix (CA) 510-286-1249
9	Pacific Coast Pipeline, CA (03/31/92)	Soil vapor extraction	Petroleum refining and reuse, ; petroleum pumping station	Soil (quantity unknown)	VOCs (Methlyene chloride, DCA, Benzene, Toluene, Ethylbenzene)	In design	PRP lead/Federal oversight	Cathy Mooremery 415-744-2243
9	Purity Oil Sales OU 2, CA (09/30/92)	Soil vapor extraction	Petroleum refining and reuse	Soil (64,000 cy)	VOCs (TCE, PCE, Chlorobenzene, BTEX)	Predesign; PD completion planned Winter 1994	PRP lead/Federal oversight; Canonie	Joanne Cola 415-744-2238
9	Raytheon, Mountain View*, CA (06/09/89)	Soil vapor extraction	Semiconductor manufacturing, Metal refinishing and aircraft maintenance	Soil (15,000 cy)	VOCs (TCE, TCA, DCE), SVOCs (Phenol)	In design; Installation planned to start January 1996	PRP lead/Federal oversight; Groundwater Technology Inc.	Elizabeth Adams 415-744-2235 Eric Madera (PRP) 415-966-7772
9	Sacramento Army Depot (Burn Pits OU), CA (03/29/93)	Soil vapor extraction	Electro-Optics equipment repair, metal plating & Treatment painting	Soil (16,900 cy)	VOCs, SVOCs	Operational; Completion planned Fall 1994; operational since Spring 1994	U.S.Army (IRP)/EPA Oversite; OHM	Marlin Mezquita 415-744-2393 Dan Osburn (SAD) 916-388-4344

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
9	Sacramento Army Depot, Tank 2 OU, CA (12/09/91)	Soil vapor extraction with air flushing	Solvent storage tank at an Army Depot	Soil (150 cy)	VOCs (PCE, Ethylbenzene and Total Xylenes)	Completed; Operational from 8/92 to 1/93	Army (USACE)/DoD Financed - IRP Program; Terra Vac	Paul Townsend (USACE Sacramento) 916-557-6947 Dan Oburn (Sacramento Army Depot) 916-388-4344 Marlin Mezquita 415-744-2393
9	Signetics (AMD 901) (TRW), Signetics OU, CA (09/11/91)	Soil vapor extraction	Semiconductor manufacturing	Soil (32,000 cy) approximately 1/4 acre down to 20 feet	VOCs (TCE, DCE, DCA)	Operational; Although ROD was signed in FY91, PRP has operated the remedy for several years	PRP lead/State oversight; Weiss & Associates	Darrin Swartz-Larson 415-744-2233 Kevin Graves (CA) 510-286-0435
9	Solvent Service, CA (09/27/90)	Soil vapor extraction with heat enhancement	Solvent recycling facility	Soil (quantity unknown)	VOCs (TCA, Acetone, Ethylbenzene, Xylene), SVOCs (Dichlorobenzene)	Operational	RWQCB; David Keith Todd Engineers	Marie Lacey 415-744-2234 Steve Morse (CA) 510-286-0304 Kevin Graves (CA) 510-286-0435
9	Spectra Physics, OU 1, CA (03/22/91)	Soil vapor extraction with horizontal wells	Semiconductor manufacturing, Laser manufacturing	Soil (7,200 cy)	VOCs (TCE)	Operational; Completion planned Winter 1997	PRP lead/State oversight; Levine - Fricke	Sean Hogan 415-744-2236 Steve Hill (CA) 510-286-4833

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
9	Van Waters and Rogers, CA (09/30/91)	Soil vapor extraction	Chemical packaging facility	Soil (quantity unknown)	VOCs (PCE, TCE, TCA)	Operational; since Fall 1993	PRP lead/State oversight; Van Waters and Rogers	Marie Lacey 415-744-2234 Susan Gladstone (CA) 510-286-0840
9	Watkins-Johnson*, CA (06/29/90)	Soil vapor extraction	Semiconductor manufacturing	Soil (quantity unknown)	VOCs (DCE, TCA, TCE)	Being installed; operation planned Fall 1994	PRP lead/Federal oversight; Watkins	Kay Lawrence 415-744-2289
10	Eielson Air Force Base*, AK (09/29/92) See also Bioremediation (In Situ)	Soil vapor extraction	Tactical air support installation Airplane fueling and maintenance	Soil (quantity unknown)	VOCs (JP-4), SVOCs (petroleum hydrocarbons, diesel fuel)	Operational	Federal Facility lead/DERA Funded; EA Engineering	Mary Jane Nearman 206-553-6642 Rielle Markey (AK) 907-451-2117 Capt. Max Gandy 907-377-4361
10	Commencement Bay/S. Tacoma Channel/Well 12A*, WA (05/03/85)	Soil vapor extraction	Solvent recycler/ paint manufacturer	Soil (100,000 cy) to 35 ft deep	VOCs (PCE, TCE, TCA)	Operational; Completion planned Fall 1999	Federal lead/Fund Financed; AWD Technologies, Inc.	Kevin Rochlin 206-553-2106
10	Fairchild AFB Priority 1 OU's (OU 1) Craig Rd LF., WA (02/13/93)	Soil vapor extraction	Landfill	Soil (945,700 cy)	VOCs (TCE)	In design; 60% design completed. Anticipate construction to start by 10/94	Federal Facility, Air Force Lead/Federal Oversite; Engineering-Science, Inc.	Cami Grandinetti 206-553-8696

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
10	Fort Lewis Military Res. Lf 4 & Sol. Refined Coal, WA (09/24/93) See also Soil Washing, Other Technologies	Soil vapor extraction with Air Sparging	Military municipal landfill	Soil (quantity unknown)	VOCs (PCE, TCE, DCE, Vinyl Chloride)	In design; Pilot study in design	Federal Facility, Army lead/Federal Oversight; USACE	Rob Kiveit 206-753-9014

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Washing

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
2	King of Prussia, NJ (09/28/90)	Soil washing using water with washing agents as an additive	Waste processing facility	Soil, Sludge, and Sediments combined (19,200 cy)	Metals (Chromium, Copper, Nickel)	Completed; operational 6/93-10/93	PRP lead/Federal oversight; Alternative Remedial Technologies, Inc.	Kim O'Connell (temporary contact) 212-264-8127
2	Myers Property, NJ (09/28/90) See also Dechlorination	Soil washing coupled with dechlorination	Pesticide manufacturing/use/ storage	Soil (48,000 cy), Sediments (500 cy)	Metals (Cadmium, Lead, Arsenic, Copper)	In design; Design completion planned Spring 1996	PRP lead/Federal oversight; Metcalf & Eddy (Design)	John Prince 212-264-1213
2	Vineland Chemical, OU 1 and OU 2, NJ (09/29/89) See also In situ Flushing	Soil Washing	Pesticide manufacturing/use/ storage	Soil (62,000 cy)	Metals (Arsenic)	In design; Design completion planned January 1995	Federal lead/Fund Financed; Ebasco (Design)	Matthew Westgate 212-264-3406 Steve Hadel (USACE - Kansas City) 816-426-5221
2	GE Wiring Devices, PR (09/30/88)	Soil washing using water with KI2 solution as an additive,	Wiring services facility	Soil and sludge combined (5,500 cy)	Metals (Mercury)	In design; Design completion planned Spring 1995	PRP lead/Federal oversight; Morrison Knudsen Corporation (Design)	Caroline Kwan 212-264-0151
4	Cabot Carbon/Koppers, FL (09/27/90) See also Bioremediation (Ex Situ), Bioremediation (In Situ)	Soil washing followed by bioremediation of fines	Wood preserving, Pine tar and turpentine manufacturing	Soil (6,400 cy)	SVOCs (PCP), PAHs, Metals (Arsenic, Chromium)	In design; Design completion planned Fall 1994	PRP lead/Federal oversight	Patsy Goldberg 404-347-6265

Soil Washing (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	Whitehouse Waste Oil Pits (amended ROD)*, FL (06/16/92) See also Bioremediation (Ex Situ)	Soil washing followed by bioremediation of fines	Waste oil recycler	Soil and Sludge combined (57,000 cy)	VOCs, PCBs, PAHs, Metals (lead)	In design; Remedy being reconsidered; further site characterizati on is underway	Federal lead/Fund Financed	Tony Best 404-347-6259
4	Cape Fear Wood Preserving, NC (06/30/89) See also Bioremediation (Ex Situ)	Soil washing using water only may be followed by s/s	Wood preserving	Soil (24,000 cy) up to 26,000 cy	PAHs (Creosote), Metals (Copper, Chromium, Arsenic)	Design completed but not installed; Construction to begin Summer 1995	Federal lead/Fund Financed	Jon Bornholm 404-347-7791
5	Zanesville Well Field, OH (09/30/91) See also Soil vapor extraction	Soil washing ex situ preceded by vacuum extraction (in situ)	Solvent recovery, Auto parts manufacturing	Soil (1,800 cy)	Metals (Lead, Mercury)	Predesign; PD completion planned Spring 1995	PRP lead/Federal oversight; Seacore Science & Engineering (Design)	Dave Wilson 312-886-1476 FTS-886-1476
5	Moss-American*, WI (09/27/90) See also Bioremediation (Ex Situ)	Soil washing followed by bioremediation of fines	Wood preserving	Soil (80,000 cy)	PAHs	Predesign; PD completion planned 1995; Bench-scale study underway	PRP lead/Federal oversight; Weston, Inc.(prime contractor), Bergmann USA (subcontractor)	Russ Hart 312-886-4844
6	Arkwood, AR (09/28/90)	Soil washing followed by incineration of residuals	Wood preserving	Soil (20,400 cy), Sludge (425 cy)	SVOCs (PCP), Dioxins, PAHs	In design; Design completion planned Fall 1995	PRP lead/Federal oversight; McLaren/Hart (Design)	Cynthia Kaleri 214-655-6772

Soil Washing (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
6	Koppers/Texarkana*, TX (09/23/88) See also In situ Flushing	Soil washing using water with a surfactant as an additive,	Wood preserving	Soil (19,400 cy)	PAHs (Benzo(a)pyrene, Creosote), Organics (NAPLs), Metals (Arsenic)	In design	PRP lead/Federal oversight; ENSR (Design)	Ursula Lennox 214-655-6743
6	South Cavalcade Street*, TX (09/26/88) See also In situ Flushing	Soil Washing	Wood preserving	Soil (11,000 cy)	PAHs (Benzo(a)pyrene, Benzo(a)anthracene, Chrysene)	In design; Design completion planned Summer 1994	PRP lead/Federal oversight	Glenn Celerier 214-655-8523
9	Koppers Company, Inc. (Oroville Plant), CA (04/04/90) See also Bioremediation (In Situ)	Soil Washing	Wood preserving	Soil (200,000 cy)	SVOCs (PCPs), Dioxins, PAHs	In design; Remedy being reconsidered	PRP lead/Federal oversight	Fred Schauffler 415-744-2359
10	Gould, Inc.*, OR (03/31/88)	Soil washing followed by s/s of solid residuals	Battery recycling/ disposal	Soil (11,000 cy), Solids (90,000 cy) Battery casings	Metals (Lead)	Operational; Completion planned Summer 1995; Operation started Fall 1993	PRP lead/Federal oversight; Canonie Environmental	Chip Humphries (EPA Oregon operat.) 503-326-2678 Mike Moran (Portland USACE) 503-326-4192
10	Naval Submarine Base, Bangor Site A, OU 1, WA (12/06/91)	Soil Washing	Federal facility, ordnance detonation	Soil (7,100 cy)	Ordnance compounds (TNT, RDX, DNT)	Being installed; operation planned to begin 9/94	Federal Facility, Navy Lead/Federal Oversite; OHM Remediation Services Corp.	Jeff Rodin 206-553-4497 Chris Drury (Navy) 206-396-5984

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Solvent Extraction

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
1	Norwood PCBs, MA (09/29/89)	Solvent extraction	PCB capacitor manufacturing/ testing	Soil (50,000 cy), Sediments (2,000 cy)	PCBs, PAHs	In design; Design completion planned Summer 1994	Federal lead/Fund Financed	Bob Cianciarulo 617-573-5778
1	O'Connor*, ME (09/27/89)	Solvent extraction (may be followed by s/s for lead)	Salvage and electrical transformer recycling	Soil and Sediments combined (23,500 cy)	PCBs, PAHs	In design; Design completion planned September 1995	PRP lead/Federal oversight	Ross Gilleland 617-573-5766
4	Carolina Transformer, NC (08/29/91)	Solvent extraction (may be followed by s/s)	Transformer repair	Soil (9,000 cy)	PCBs	In design; Design completion planned Spring 1995	Federal lead/Fund Financed	Luis Flores 404-347-7791
6	United Creosoting*, TX (09/29/89)	Solvent extraction (Critical fluid extraction followed by incineration of fluids)	Wood preserving	Soil (85,000 cy) with "tar mats" combined	SVOCs (PCP, trace dioxins/furans), PAHs	Design completed but not installed; Installation scheduled for Summer 1995	State lead/Fund Financed; C.F. Systems	Earl Hendrick 214-655-8519 LaReine Pound (TX) 512-239-2437

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Thermal Desorption

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
1	Cannon Engineering/Bridgewater, MA (03/31/88)	Thermal aeration (vapors captured on carbon)	Chemical waste storage and incineration facility	Soil (11,000 cy)	VOCs (TCE, Vinyl Chloride, Benzene, Toluene)	Completed; Operational from 5/90 to 10/90	PRP lead/Federal oversight; Canonie Engineering	Richard Goehlert 617-573-5742
1	Re-Solve*, MA (09/24/87)	Low temperature thermal treatment	Chemical reclamation facility	Soil (22,500 cy)	VOCs, PCBs	Operational; Completion planned Fall 1994	PRP lead/Federal oversight; Chemical Waste Management, Inc.	Joe Lemay 617-573-9622
1	McKin*, ME (07/22/85)	Thermal aeration (vapors captured on carbon)	Waste storage/Transfer & recycle facility.	Soil (11,500 cy)	VOCs (TCE, BTX)	Completed; Operational from 7/86 - 2/87	PRP lead/Federal oversight; Canonie Engineering	Sheila Eckman 617-573-5784
1	Ottati & Goss, NH (01/16/87)	Thermal aeration	Drum storage/ disposal	Soil (16,000 cy)	VOCs (TCE, PCE, DCA, Benzene)	Completed; Operational from 6/89 to 9/89	PRP lead/Federal oversight; Canonie Engineering	Stephen Calder 617-573-9626
2	Industrial Latex, OU 1, NJ (09/30/92)	Low temperature thermal treatment	Manufacturing of chemical adhesives and natural and synthetic rubber compounds	Soil and Sediments combined (34,700 cy)	PCBs	Predesign; PD completion planned Fall 1994	Federal lead/Fund Financed	Romona Pezzella 212-264-8216

Thermal Desorption (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
2	Lipari Landfill Marsh Sediment*, NJ (07/11/88)	Low temperature thermal treatment	Industrial landfill, Municipal landfill	Soil (57,000 cy) marsh soil	VOCs (Chlorinated hydrocarbons, BTEX), SVOCs (Bis-2-chloroethy lether)	Being installed; Operation to begin Summer 1994; completion scheduled for late 1994/early 1995	PRP lead/Federal oversight; Sevenson Environmental Services (prime contractor), Williams Environmental (subcontractor)	Fred Cataneo 212-264-9542
2	Metaltec/Aerosystems, OU 1 - Soil Treatment*, NJ (06/30/86)	Low temperature thermal treatment (vapors captured on carbon)	Metal manufacturing	Soil (9,000 cy)	VOCs (TCE)	Operational; Completion planned December 1994	Federal lead/Fund Financed; USACE conducting design	Courtney McEnery 212-264-1251 Mark Keast (USACE, Kansas City) 816-426-5832
2	Reich Farms*, NJ (09/30/88)	Thermal desorption (vapors will be captured on carbon)	Drum storage/ disposal	Soil (8,600 cy)	VOCs (TCE, PCE, TCA), SVOCs (Phthalates)	In design; Design completion planned Summer 1994	PRP lead/Federal oversight	Kim O'Connell (temporary contact) 212-264-8127
2	Universal Oil Products, NJ (09/30/93)	Thermal Desorption	Chemical processing plant	Soil (23,000 cy)	VOCs, PCBs, PAHs	In design; Design completion planned Summer 1995	State lead/Fund Financed	Rich Puvogel 212-264-9836 Gwen Barunus (NJ) 609-633-1455

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

Thermal Desorption (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
2	Waldick Aerospace Devices (OU 1)*, NJ (09/29/87)	Low temperature thermal treatment (followed by offsite s/s and disposal)	Manufacture/ electroplating of plane parts	Soil (4,000 cy)	VOCs (TCE, PCE)	Completed; Operational from 5/93 to 10/93	Federal lead/Fund Financed; Rust Remedial Services, Inc.	John Prince 212-264-1213 George Buc (USACE-NY District) 908-389-3040
2	American Thermostat, NY (06/29/90)	Low temperature thermal treatment	Thermostat manufacturing	Soil (20,000 cy)	VOCs (PCE, TCE)	Operational; Completion planned December 1994	Federal lead/Fund Financed; EBASCO (prime contractor), Williams Environmental Services (subcontractor)	Christos Tsiamis 212-264-5713
2	Claremont Polychemical - Soil Remedy, NY (09/28/90)	Low temperature thermal treatment	Paint/ink formation	Soil (3,000 cy)	VOCs (PCE)	In design; Design completion planned Summer 1994	Federal lead/Fund Financed; USACE conducting design	Dick Kaplin 212-264-3819
2	Fulton Terminals, Soil Treatment, NY (09/29/89)	Low temperature thermal treatment	Former hazardous waste storage facility	Soil (8,000 cy) (Depth varies from 12 to 15 feet).	VOCs (TCE, DCE, Benzene, Xylene)	In design; Design completion planned January 1995	PRP lead/Federal oversight	Christos Tsiamis 212-264-5713
2	Reynolds Metals Company Study Area Site, (RMC), NY (09/27/93)	Thermal Desorption	Active aluminum production plant	Sediments (14,500 cy)	PCBs	In design; Design completion planned December 1995	PRP lead/Federal oversight	Lisa Carson 212-264-6857

Thermal Desorption (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
2	Sarney Farm, NY (09/27/90)	Thermal Desorption	Industrial landfill, Municipal landfill	Soil (2,400 cy) 2,000 - 8,000 cy	VOCs (Chloroform, TCE, PCE, Toluene), SVOCs (Phthalates)	In design; Design completion planned early 1995	Federal lead/Fund Financed; CDM (Design)	Kevin Willis 212-264-8777
2	Solvent Savers, NY (09/30/90)	Low temperature thermal treatment	Solvent recovery, Chemical reclamation	Soil (60,000 cy)	VOCs (DCE, TCE), PCBs	Predesign; PD completion planned Fall 1994	PRP lead/Federal oversight	Lisa Wong 212-264-9348
3	U.S.A. Letterkenny SE Area, OU1*, PA (06/28/91)	Low temperature thermal treatment (may need s/s for metals after thermal desorption)	Munitions manufacturing/ storage, Drum storage	Soil (15,000 cy)	VOCs (TCE, DCE, Ethylbenzene, Xylene)	Operational; Completion planned November 1994; Site work began 7/93; full-scale clean up 12/93; start up again in 5/94	Federal lead/Fund Financed; McLaren Hart	Dennis Orenshaw 215-597-7858 Brian Hoke (Letterkenny) 717-267-8483
3	William Dick Lagoons, OU 3, PA (03/31/93)	Thermal Desorption	Wastewater disposal lagoons	Soil (24,000 cy)	VOCs (TCE, PCE, MEK), SVOCs	Predesign; PD completion planned Fall 1994; Negotiating Consent Decree. PRP conducting a treatability study for SVE on deep soil layer	PRP lead/Federal oversight	Patrick McManus 215-597-8257

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

Thermal Desorption (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
3	Rentokil, VA (06/22/93)	Thermal Desorption	Wood preserving	Soil (13,000 cy)	SVOCs (PCP), Dioxins, PAHs	In design; Design completion planned late 1995	PRP lead/Federal oversight	Andy Palestini 215-597-1286
3	Saunders Supply Co, OU 1, VA (09/30/91) See also Dechlorination	Low temperature thermal treatment	Wood preserving	Soil (25,000 cy)	SVOCs (PCP)	In design; Design completion planned Spring 1995; Treatability studies planned	Federal lead/Fund Financed	Andy Palestini 215-597-1286
4	Ciba-Geigy (MacIntosh Plant) OU 2, AL (09/30/91) See also In situ Flushing	Low temperature thermal treatment	Agriculture applications, Pesticide manufacturing/use/ storage, Other organic chemical manufacturing	Soil and sludge combined (130,000 cy) to 20 ft depth	VOCs, Biocides	Predesign; PD completion planned summer 1996; Treatability studies ongoing; final decision on technology will be made late 1994	PRP lead/Federal oversight	Charles King 404-347-6262
4	Ciba-Geigy (MacIntosh Plant) OU 4, AL (07/14/92) See also In situ Flushing	Thermal Desorption	Agriculture applications, Pesticide manufacturing/use/ storage, Other organic chemical manufacturing	Soil and other waste combined (17,000 cy)	VOCs (Chloroform, Toluene, Xylene), Biocides (Atrazine, Diazinon, Prometryn, Simazine)	Predesign; Treatability studies ongoing; final decision on technology will be made late 1994	PRP lead/Federal oversight	Charles King 404-347-6262

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Thermal Desorption (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	Smith's Farm Brooks, OU 1*, KY (09/30/91) See also Dechlorination	Thermal desorption Anaerobic low temperature thermal treatment	Drum storage/ disposal	Soil (18,500 cy)	PCBs, PAHs (Carcinogenic PAHs)	Operational; Completion planned October 1994; Began operation in April 1994	PRP lead/Federal oversight; Canonie (prime contractor), SoilTech (subcontractor)	Tony DeAngelo 404-347-7791
4	Aberdeen Pesticide Dumps, (OU 1 & OU 4), NC (09/30/91)	Thermal Desorption	Pesticide manufacturing/use/ storage	Soil (124,000 cy)	Biocides (DDT, Toxaphene, Benzene Hexachloride)	Predesign; PD completion planned Spring 1995	PRP lead/Federal oversight	Kay Crane 404-347-7791 Randy McElveen (NC) 919-733-2801
4	Potter's Septic Tank Service Pits, NC (08/05/92)	Low temperature thermal treatment	Waste petroleum and septic tank sludge disposal pit	Soil (10,100 cy), Sludge (quantity unknown)	VOCs (BTEX), PAHs (Carcinogenic PAHs, Naphthalene)	In design; Design completion planned Summer 1994	Federal lead/Fund Financed	Beverly Hudson 404-347-7791
4	Sangamo/Twelve-Mile/Hartwell PCB, OU 1, SC (12/19/90)	Thermal desorption (vapors captured on carbon)	Capacitor manufacturer	Soil and Sludge combined	PCBs	In design; Design completion planned late 1995	PRP lead/Federal oversight	Bernie Hayes 404-347-7791 Richard Haynes (SC) 803-734-5487
4	Wamchem*, SC (06/30/88)	Thermal desorption using catalytic oxidation of vapor	Former dye manufacturing plant	Soil (2,200 cy)	VOCs (BTX)	Completed; operational during 8/93	PRP lead/Federal oversight; Four Seasons	Terry Tanner 404-347-7791

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Thermal Desorption (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	Arlington Blending & Packaging Co., OU 1*, TN (06/28/91)	Thermal desorption, residual soil and vapor to be dechlorinated	Pesticide manufacturing/use/ storage, Other organic chemical manufacturing	Soil (5,000 cy)	VOCs, SVOCs (PCP), Biocides (Chlordane, Heptachlor)	In design; Design completion planned Fall 1994	PRP lead/Federal oversight	Derek Matory 404-347-7791
5	Acme Solvent Reclaiming, Inc. OU 3 & OU 6, IL (12/31/90) See also Soil vapor extraction	Low temperature thermal treatment followed by s/s for lead	Industrial landfill, Municipal water supply	Soil (6,000 cy)	VOCs (TCA, DCE, DCA, TCE, PCE, Vinyl chloride, Benzene, 4-methyl 2 pentanone), SVOCs (Naphthalene), PCBs	In design; Design completion planned Summer 1994	PRP lead/Federal oversight; Harding Lawson	Deborah Orr 312-886-7576
5	Outboard Marine/Waukegan Harbor, OU 3*, IL (03/31/89)	Low temperature thermal treatment	Marine products manufacturing	Soil and sediments combined (16,000 cy)	PCBs	Completed; Operational from 1/92 to 7/92	PRP lead/Federal oversight; Soiltech	Bill Bolen 312-353-6316
5	American Chemical Services*, IN (09/30/92) See also Soil vapor extraction	Low temperature thermal treatment	Other organic chemical manufacturing, Solvent recovery	Soil (quantity unknown)	VOCs, PCBs	Predesign; Schedule pending completion of negotiation with PRPs	In negotiation	Bill Bolen 312-353-6316
5	Reilly Tar and Chemical, IN (09/30/93)	Thermal Desorption	Wood preserving, Coal tar refinery and synthethic chemical plant	Soil (10,000 cy)	VOCs, SVOCs (PAHs,Pyridine)	Predesign; Scheduled to end Summer 1994	PRP lead/Federal oversight	Dion Novak 312-886-4737
5	Anderson Development (ROD Amendment)*, MI (09/30/91)	Low temperature thermal treatment With off-site disposal of residuals	Other organic chemical manufacturing	Soil and sludge combined (5,100 cy)	Organics (MBOCAs, 4, 4'- Methylene, Bis-2-chloroanili ne)	Completed; Operational from 9/92 to 6/93	PRP lead/Federal oversight; Weston Services, Inc	Jim Hahnenberg 312-353-4213

Thermal Desorption (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
5	Carter Industries*, MI (09/18/91)	Low temperature thermal treatment (followed by s/s of soils and incin. of PCB oil)	Scrap metal salvager	Soil (20,000 cy) combined	PCBs	In design; Design completion planned Summer 1994; Installation planned to begin Fall 1994	PRP lead/Federal oversight; Connestoga-Rovers Associates	Jon Peterson 312-353-1264
5	Duell-Gardner Landfill, MI (09/07/93)	Low temperature thermal treatment	Industrial landfill, Municipal landfill	Soil (1,800 cy)	SVOCs (Bis(2-ethyl hexyl)Phthalate), Biocides, PCBs	Predesign	State lead/Fund Financed	Karla Johnson 312-886-5993
5	Ott/Story/Cordova Chemical, MI (09/27/93)	Thermal Desorption	Other inorganic chemical manufacturing	Soil (7,800 cy), Sediments (quantity unknown)	VOCs, Biocides	In design; Design completion planned Summer 1995	Federal lead/Fund Financed; USACE (design)	Betty Lavis 312-886-4784
5	Pristine (ROD Amendment)*, OH (03/30/90) See also Soil vapor extraction	Thermal desorption Anaerobic thermal treatment	Industrial waste treatment facility	Soil (13,000 cy)	SVOCs (Pesticides, PAHs)	Completed; Operational from 9/93 to 3/94	PRP lead/Federal oversight	Thomas Alcama 312-886-7278
7	Sherwood Medical, NE (09/28/93)	Thermal Desorption	Operating industrial facility	Soil (quantity unknown)	VOCs (TCE, TCA, DCA, Vinyl Chloride)	Predesign	Federal lead/Fund Financed	Steve Auchterlonie 913-551-7778

Thermal Desorption (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
8	Martin Marietta (Denver Aerospace), CO (09/24/90) See also Soil vapor extraction	Low temperature thermal treatment (followed by s/s of soils and incin. of vapors)	Aerospace equipment manufacturer - bulk storage facility	Soil (2,300 cy)	VOCs (TCE), PCBs	In design; Design completion planned Fall 1994	PRP lead/State oversight; under RCRA; Geraghty & Miller	George Dancik 303-293-1506 Charles Johnson (CO) 303-692-3348
8	Sand Creek Industrial, OU 5*, CO (09/28/90)	Low temperature thermal treatment	Pesticide manufacturing/use/ storage	Soil (9,500 cy)	Organics (Pesticides)	Operational; Completion planned Fall 1994	Federal lead/Fund Financed; Rust Remedial Services	Erna Acheson 303-294-1971
10	Harbor Island, WA (09/30/93)	Thermal Desorption	General industrial area	Soil (91,000 cy)	VOCs (TPH)	Predesign; Negotiating consent decree agreement with PRP	Federal lead/Fund Financed	Keith Rose 206-553-7721

Other

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
1	South Municipal Water Supply Well*, NH (09/27/89) See also Soil vapor extraction	Air sparging	Ball bearing manufacturing	Groundwater	VOCs (PCE,TCA,TCE)	Installed but not operational; operation to begin October 1994; completion planned 2011	PRP lead/Federal oversight	Roger Duwart 617-573-9628 Tom Andrews (NH) 603-271-2910
1	Peterson/Puritan Inc. (OU 1), RI (09/30/93) See also Soil vapor extraction	In situ Oxidation	Custom manufacturing facility Industrial and commercial area	Soil (1,000 cy)	Metals (Arsenic)	Predesign; EPA negotiating with PRP	PRP lead/Federal oversight	Dave Newton 617-573-9612 Leo Hellested (RI) 401-277-2797
2	Applied Environmental Services, OU 1, NY (06/24/91) See also Bioremediation (In Situ), Soil vapor extraction	Air sparging	Bulk petroleum and hazardous waste storage facility, fuel blending	Groundwater	VOCs (BTEX), SVOCs, PAHs	Design completed but not installed	PRP lead/State oversight	Mel Hauptman 212-264-7681 John Grathwol (NY) 518-457-9280
3	Brodhead Creek, OU 1, PA (03/29/91)	CROW technology using hot water injection to mobilize coal tar	Coal gasification	Soil (9,000 cy) 25-35 ft deep, 100 ft by 80 ft	PAHs	Being installed; planned to be operational August 1994; completion planned January 1995	PRP lead/Federal oversight; Remediation Technologies, Western Research Institute	John Banks 215-597-8555
3	Brown's Battery Breaking Site, OU 2, PA (07/02/92) See also Other Technolgoies	Limestone barrier	Battery recycling/ disposal	Groundwater	Metals (Lead)	Predesign; in negotiation	PRP lead/Federal oversight	Richard Watman 215-597-8996

Table A-1
Remedial Actions: Site-specific Information By Technology Through FY 1993

June 1994

Other (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
3	Brown's Battery Breaking Site, OU 2, PA (07/02/92) See also Chemical Treatment	Fuming gasification	Battery recycling/ disposal	Soil and solids combined (45,000 cy)	Metals (Lead)	Predesign	PRP lead/Federal oversight; negotiations underway	Richard Watman 215-597-8996
3	Saegertown Industrial Area Site, PA (01/29/93) See also Soil vapor extraction	Air sparging	Industrial park (Lord Corp. property)	Groundwater	VOCs (PCE, TCA)	In design; Design completion planned Fall 1995	PRP lead/Federal oversight	Steve Donohue 215-597-3166 Bob Kimball (PA) 814-332-6075
3	Tonolli Corporation, PA (09/30/92)	Limestone barrier	Battery recycling/ disposal	Groundwater	Metals (Lead)	Predesign; PD completion planned Summer 1994	PRP lead/Federal oversight	Linda Dietz 215-597-6906
4	Rochester Property, SC (08/31/93)	Air sparging	Disposal site	Groundwater	VOCs (TCE, bis (2-ethylhexyl phthalate))	Predesign; Design to be completed Winter 1994	PRP lead/Federal oversight	Sheri Panabaker 404-347-7791
5	Allied Chem & Ironton Coke, OU 2*, OH (12/28/90) See also Bioremediation (Ex Situ), Bioremediation (In Situ)	Land farming magnetically enhanced	Coke manufacturing	Soil (23,000 cy)	PAHs	In design; Operations to begin Spring 1995	PRP lead/Federal oversight; IT Corporation (Design), Black & Veetch (subcontractor)	Tom Alcamo 312-886-7278
6	Prewitt Abandoned Refinery, NM (09/30/92) See also Bioremediation (Ex Situ), Soil vapor extraction	Air sparging	Crude oil refinery	Groundwater	Organics (NAPLs)	Predesign	PRP lead/Federal oversight	Monica Chapa-Smith 214-655-6780

Other (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
6	Petro-Chemical Systems, Inc., OU 2, TX (09/06/91) See also Soil vapor extraction	Air sparging	Petroleum refining and reuse	Groundwater to a depth of 30 feet	VOCs (BTEX), SVOCs (Naphthalene)	Predesign; PD completion planned Summer 1995; pilot study planned Fall 1994	PRP lead/Federal oversight	Chris Villareal 214-655-6758
9	Hexcel, CA (09/21/93) See also Bioremediation (In Situ), Soil vapor extraction	Air sparging	Manufacturing	Groundwater	VOCs (PCE, Acetone, MEK, Benzene)	Predesign; PD completion planned Fall 1994	PRP lead/State oversight	Mark Johnson 510-286-0305
10	Fairchild AFB, Priority 1 OU's (OU 2) FT-1, WA (07/14/93) See also Bioremediation (In Situ)	Air sparging	Fire training area	Groundwater	VOCs (Benzene)	In design; Treatability studies/pilot test 5/94	Federal Facility, Air Force lead/Federal oversight	Carmela Grandinetti 206-553-8696
10	Fort Lewis Military Res. Lf 4 & Sol. Refined Coal, WA (09/24/93) See also Soil Washing, Soil vapor extraction	Air sparging	Military municipal landfill	Groundwater	VOCs (PCE, TCE, DCE, Vinyl chloride)	In design; Pilot study in design	Federal facility, U.S. Army lead/Federal oversight	Bob Kievit 206-753-9014

TABLE A-2

REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

Table A-2 shows NPL sites at which established treatment technologies have been selected as part of the remedy. Established treatment technologies include: incineration, solidification/stabilization, and others. The sites are ordered by fiscal year to give some initial information on the status of implementation: in general, earlier RODs have progressed furthest in design and construction.

TABLE A-2

REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

June 1994

On-Site Incineration

FY	REGION	SITE NAME	STATE
85	2	Bog Creek Farm	NJ
85	2	Bridgeport Rental & Oil	NJ
85	5	ACME Solvent	IL
85	6	MOTCO	TX
86	1	Baird & McGuire	MA
86	4	Mowbray Engineering	AL
86	5	LaSalle Electrical Utilities	IL
86	5	Arrowhead Refinery	MN
86	5	Fields Brook	OH
86	6	Sikes Disposal Pit	TX
87	1	Ottati & Goss	NH
87	1	Davis Liquid Waste	RI
87	4	Tower Chemical	FL
87	4	Geiger/C&M Oil	SC
87	5	Rose Township Dump	MI
87	5	Laskin/Poplar Oil	OH
87	6	Bayou Bonfouca	LA
87	6	Cleve Reber	LA
88	1	Rose Disposal Pit	MA
88	2	Lipari Landfill	NJ
88	2	Love Canal	NY
88	3	Delaware Sand & Gravel	DE
88	3	Southern Maryland Wood Treating	MD
88	3	Drake Chemical/Phase III	PA
88	3	Ordnance Works Disposal	WV
88	4	Zellwood Groundwater	FL
88	5	LaSalle Electrical Utilities	IL
88	5	Fort Wayne Reduction	IN
88	5	Forest Waste Products	MI
88	5	Pristine	OH

On-Site Incineration (continued)

FY	REGION	SITE NAME	STATE
88	5	Summit National Liquid Disposal	OH
88	6	Old Midland Products	AR
88	6	Brio Refining	TX
88	7	Times Beach	MO
88	8	Broderick Wood Products	CO
89	1	Baird and McGuire	MA
89	1	Wells G&H	MA
89	2	Bog Creek Farm	NJ
89	2	De Rewal Chemical*	NJ
89	3	Douglasville Disposal	PA
89	4	Smith's Farm Brooks*	KY
89	4	Aberdeen Pesticide Dumps/ Fairway	NC
89	4	Celanese*	NC
89	4	American Creosote Works	TN
89	5	Ninth Avenue Dump	IN
89	5	New Brighton/Arden Hills	MN
89	5	Big D Campground	OH
89	5	Laskin/Poplar Oil	OH
90	1	New Bedford*	MA
90	2	Sarney Farm	NY
90	3	M.W. Manufacturing*	PA
90	5	Sangamo/Crab Orchard* National Wildlife Refuge	IL
90	5	Fisher Calo	IN
90	5	Bofors Nobel	MI
90	5	Springfield Township Dump*	MI
90	5	Pristine (Amendment)	OH
90	5	University of Minnesota	MN
90	6	Vertac	AR
90	6	Texarkana Wood Preserving	TX
90	7	Missouri Electric Works	MO

* Residuals to be treated with soldification/stabilization.

TABLE A-2 (continued)
REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

On-Site Incineration (continued)

FY	REGION	SITE NAME	STATE
90	7	Hastings Groundwater Contamination (East Industrial Park)	NE
90	10	FMC Yakima Pit	WA
91	3	Whitmoyer Labs, Inc. OU3	PA
91	3	Eastern Diversified Metals	PA
91	4	Ciba Geigy Corp.	AL
91	5	Allied Chem & Ironton Coke	OH
92	4	Alabama Army Ammunition Plant (Operable Unit 1)	AL
92	5	Savanna Army Depot	IL
92	6	Gulf Coast Vacuum Services (Operable Unit 1)	LA
93	3	Seagertown Industrial	PA
93	3	Mathis Brothers Landfill (South Marble Top Road)	GA
93	5	MacGillis&Gibbs Bell Lumber & Pole	MN
93	6	American Cresote Works (Winnfield Plant)	LA
93	6	Vertac	AR

Off Site Incineration

FY	REGION	SITE NAME	STATE
84	5	Berlin & Farro Liquid Incineration	MI
84	5	Laskin/Poplar Oil	OH
84	10	Western Processing Phase I	WA

Off-Site Incineration (continued)

FY	REGION	SITE NAME	STATE
85	2	Swope Oil & Chemical	NJ
85	5	Byron/Johnson Salvage Yard	IL
85	6	Triangle Chemical	TX
85	8	Woodbury Chemical	CO
86	3	Drake Chemical/Phase II	PA
86	3	Westline	PA
86	5	Metamora Landfill	MI
86	5	Spiegelberg Landfill	MI
86	7	Ellisville Area/Bliss	MO
87	2	Williams Property	NJ
87	4	Sodyeco	NC
87	6	Sand Springs Petrochemical Complex	OK
88	1	Cannon Engineering/Plymouth	MA
88	2	Ewan Property	NJ
88	2	Reich Farms	NJ
88	2	Brewster Well Field	NY
88	3	Wildcat Landfill	DE
88	3	Berks Sand Pit	PA
88	3	Douglassville Disposal	PA
88	3	Fike Chemical	WV
88	5	Belvidere Municipal Landfill #1	IL
88	6	S. Calvacade St.	TX
88	7	Minker/Stout/Romaine Creek (R&S)	MO
88	7	Syntex	MO
89	1	W.R. Grace (Acton Plant)	MA
89	1	O'Connor	ME
89	1	Pinette's Salvage Yard	ME

* Residuals to be treated with soldification/stabilization.

TABLE A-2 (continued)
REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

Off-Site Incineration (continued)

FY	REGION	SITE NAME	STATE
89	2	Claremont Polychemical	NY
89	3	M.W. Manufacturing	PA
89	3	Whitmoyer Laboratories	PA
89	4	Newsom Brothers Old Reichold	MS
89	5	Cross Brothers Pail	IL
89	5	Outboard Marine/Waukegan Harbor	IL
89	5	Wedzeb	IN
89	5	Cliff/Dow Dump	MI
89	5	Alsco Anaconda	OH
89	6	United Creosoting	TX
89	8	Woodbury Chemical	CO
90	1	Beacon Heights Landfill	CT
90	1	Kearsarge Metallurgical	NH
90	2	FAA Technical Center	NJ
90	2	Hooker Chemical-Ruco Polymer	NJ
90	2	Sayreville landfill	NJ
90	2	Mattiace Petrochemicals	NY
90	2	Sealand Restoration	NY
90	3	Greenwood Chemical*	VA
90	6	Arkwood	AR
90	6	Jacksonville Municipal Landfill	AR
90	6	Rogers Road Municipal Landfill	AR
90	6	Hardage/Criner (Amendment)	OK
90	7	Fairfield Coal Gasification Plant	IA
90	7	Shenandoah Stables	MO
90	8	Martin Marietta (Denver Aerospace)	CO
90	8	Sand Creek Industrial	CO
90	8	Ogden Defense Depot	UT
91	1	Union Chemical	ME
91	2	Curcio Scrap Metal	NJ
91	2	Swope Oil	NJ
91	2	Waldick Aerospace Devices, Inc.	NJ

Off-Site Incineration (continued)

FY	REGION	SITE NAME	STATE
91	2	Circuitron	NY
91	2	Mattiace Petrochemical	NY
91	3	Brodhead Creek	PA
91	3	Eastern Diversified Metals	PA
91	3	Dixie Cavern County Landfill	VA
91	4	Aberdeen Pesticide Dumps (Amendment)	NC
91	4	Wrigley Charcoal	TN
91	5	Acme Solvent Reclaiming Inc.	IL
91	5	Main Street Wellfield	IN
91	5	Thermo Chem	MI
91	5	Carter Industries	MI
91	5	Summit National Liquid Disposal Service (Amendment)	OH
91	6	Petrochemical (Turtle-Bayou)	TX
91	7	Peoples Natural Gas	IA
91	7	Ellisville Area Site	MO
91	7	Ellisville Area (Amendment)	MO
91	7	Kem-Pest Laboratories	MO
91	8	Broderick Wood Products	CO
91	8	Hill AFB	UT
91	9	Advanced Micro Devices Inc.	CA
91	10	Commencement Bay - Nearshore/ Tideflats	WA
91	10	Northwest Transformer - Mission Pole	WA
92	2	Ellis Property	NJ
92	3	Fike Chemical	WV
92	5	American Chemical Services	IN
92	8	Ogden Defense Depot (Operable Unit 3)	UT
92	9	Westinghouse Electric (Sunnyvale Plant)	CA
92	10	Pacific Hide & Fur Recycling (Amendment)	ID

* Residuals to be treated with soldification/stabilization.

TABLE A-2 (continued)

REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

Off-Site Incineration (continued)

FY	REGION	SITE NAME	STATE
92	10	U.S. DOE Idaho National Engineering Lab (Operable Unit 23)	ID
93	1	Davisville Naval Construction Battalion Center	RI
93	1	Pinettes Salvage Yard	ME
93	3	Hunterstown Road	PA
93	3	Pentokil Virginia Wood Preserving	VA
93	4	Koppers (Morrisville Plant)	NC
93	6	Vertac	AR
93	8	Montana Pole and Treating	MT
93	8	Rocky Mountain Arsenal (OU29)	CO
93	8	Utah Power and Light/American Barrel	UT
93	10	Hanford 1100-Area (DOE)	WA
93	10	Harbor Island-Lead	WA

Off-Site Incineration (continued)

FY	REGION	SITE NAME	STATE

* Residuals to be treated with soldification/stabilization.

Solidification/Stabilization

FY	REGION	SITE NAME	STATE
82	3	Bruin Lagoon	PA
84	6	Bioecology Systems	TX
85	4	General Refining	GA
85	4	Davie Landfill	FL
85	10	Western Processing/Phase II	WA
86	2	Marathon Battery	NY
86	3	Bruin Lagoon	PA
86	4	Pepper's Steel & Alloy	FL
86	4	Sapp Battery Salvage	FL
86	5	Burrows Sanitation	MI
86	5	Forest Waste Products	MI
87	1	Davis Liquid Waste	RI
87	2	Chemical Control	NJ
87	2	Myers Property	NJ
87	2	Waldick Aerospace	NJ
87	4	Gold Coast	FL
87	4	Geiger/C&M Oil	SC
87	4	Independent Nail	SC
87	4	Palmetto Wood Preserving	SC
87	5	Liquid Disposal	MI
87	5	Northern Engraving	WI
87	6	Gurley Pit	AR
87	6	Mid-South Wood	AR
87	6	Cleve Reber	LA
87	6	Sand Spring Petrochemical Complex	OK
88	1	Charles George Land Reclamation	MA

Solidification/Stabilization (continued)

FY	REGION	SITE NAME	STATE
88	2	Love Canal	NY
88	2	Marathon Battery	NY
88	2	York Oil	NY
88	3	Alladin Plating	PA
88	3	Fike Chemical	WV
88	4	Brown Wood Preserving	FL
88	4	Flowood	MS
88	4	Chemtronics	NC
88	5	Velsicol Chemical	IL
88	5	Mid-State Disposal Landfill	WI
88	6	Industrial Waste Control	AR
88	6	Bailey Waste Disposal	TX
88	6	Brio Refining	TX
88	6	French Limited	TX
88	7	Midwest Manufacturing/ North Farm	IA
88	9	Selma Pressure Treating	CA
88	10	Pacific Hide & Fur Recycling	ID
88	10	Gould	OR
88	10	Commencement Bay/NTF	WA
88	10	Frontier Hard Chrome	WA
89	1	Sullivan's Ledge	MA
89	1	W.R. Grace (Acton Plant)	MA
89	1	O'Connor	ME
89	2	DeRewal Chemical	NJ
89	2	Marathon Battery	NY
89	3	Craig Farm	PA
89	3	Douglassville Disposal	PA
89	3	Hebelka Auto Salvage Yard	PA
89	3	Ordnance Works Disposal	WV
89	4	Kassouf-Kimerling Battery	FL
89	4	Smith Farm Brooks	KY
89	4	Cape Fear Wood Preserving	NC
89	4	Celanese	NC
89	4	Amnicola Dump	TN

TABLE A-2 (continued)

REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

Solidification/Stabilization (continued)

FY	REGION	SITE NAME	STATE
89	5	MIDCO I	IN
89	5	MIDCO II	IN
89	5	Auto Ion Chemicals	MI
89	6	Pesses Chemical	TX
89	6	Sheridan Disposal Services	TX
89	7	Vogel Paint & Wax	IA
89	9	Koppers (Oroville Plant)	CA
89	9	Purity Oil Sales	CA
90	1	New Bedford	MA
90	2	Roebling Steel	NJ
90	3	M.W. Manufacturing	PA
90	3	C&R Battery	VA
90	3	Greenwood Chemical	VA
90	4	62nd Street Dump	FL
90	4	Cabot/Koppers	FL
90	4	Coleman-Evans Wood Preserving (Amendment)	FL
90	4	Kassourf-Kimerling Battery Disposal	FL
90	4	Schuylkill Metal	FL
90	4	Yellow Wate Road	FL
90	4	Zellwood Groundwater Contamination (Amendment)	FL
90	5	Sangamo/Crab Orchard National Wildlife Refuge	IL
90	5	Wayne Waste Oil	IN
90	5	Springfield Township Dump	MI
90	5	Oconomowoc Electroplating	WI
90	6	Jacksonville Municipal Landfill	AR
90	6	Rogers Road Municipal Landfill	AR
90	7	Shenandoah Stables	MO
90	7	Hastings Groundwater Contamination (East Industrial Park)	NE
90	8	Martin Marietta (Denver Aerospace)	CO

Solidification/Stabilization (continued)

FY	REGION	SITE NAME	STATE
90	8	Rocky Mountain Arsenal (OU 17)	CO
90	9	J.H. Baxter	CA
90	10	Teledyne Wah Chang Albany (TWCA)	OR
91	1	Silresin Chemical	MA
91	1	Sullivan's Ledge	MA
91	1	Union Chemical	MA
91	2	Asbestos Dump	NJ
91	2	Nascolite Corp.	NJ
91	2	NL Industries	NJ
91	2	Roebling Steel	NJ
91	2	Waldick Aerospace Services Inc.	NJ
91	2	White Chemical Corp.	NJ
91	3	Halby Chemical	DE
91	3	Mid-Atlantic Wood Preservers	MD
91	3	Eastern Diversified Metals	PA
91	3	Hebelka Auto Salvage Yard	PA
91	3	Whitmoyer Lab (OU3)	PA
91	3	Whitmoyer Lab (OU2)	PA
91	3	U.S.A. Letterkenny SE	PA
91	3	First Piedmont Quarry 719	VA
91	3	Saunders Supply	VA
91	4	Interstate Lead Co.	AL
91	4	USAF Robins Air Force Base	GA
91	4	Maxey Flats Nuclear Disposal	KY
91	4	Golden Strip Septic Tank	SC
91	4	Aberdeen Pesticide Dump (Amendment)	NC
91	4	Carolina Transformer	NC
91	4	Arlington Blending and Packaging Co.	TN
91	4	Oak Ridge OU3	TN
91	4	Wrigley Charcoal	TN
91	5	Acme Solvents	IL
91	5	Carter Industries	MI
91	6	Cimarron Mining Corp.	NM

Solidification/Stabilization (continued)

FY	REGION	SITE NAME	STATE
91	7	IE Dupont de Nemours & Co., Inc.	IA
91	7	Mid-America Tanning	IA
91	7	Shaw Avenue Dump	IA
91	8	Anaconda Co. Smelter	MT
91	9	FMC (Fresno Plant)	CA
91	9	Valley Wood Preserving	CA
92	1	PSC Resources	MA
92	2	Cosden Chemical Coatings	NJ
92	2	Facet Enterprises	NY
92	2	Preferred Plating	NY
92	3	Abex	VA
92	3	C & D Recycling	PA
92	3	Fike Chemical	WV
92	3	Paoli Rail Yard	PA
92	3	Rhinehart Tire Fire Dump	VA
92	3	Tonolli	PA
92	4	Agrico Chemical	FL
92	4	Ciba-Geigy (McIntosh Plant)	AL
92	4	Florida Steel	FL
92	4	JFD Electronics/Channel Masters	NC
92	4	Marine Corps Logistics Base	GA
92	4	Savannah River (USDOE) (Operable Unit 1)	SC
92	4	Whitehouse Waste Oil Pits (Amendment)	FL
92	5	Electrovoice	MI
92	5	H. Brown Company	MI
92	5	Peerless Plating	MI
92	5	Savanna Army Depot	IL
92	5	Spickler Landfill	WI
92	5	Tar Lake	MI
92	6	Cal West Metals	NM
92	6	Double Eagle Refinery	OK
92	6	Fourth Street Abandoned Refinery	OK

Solidification/Stabilization (continued)

FY	REGION	SITE NAME	STATE
92	6	Gulf Coast Vacuum Services (Operable Unit 1)	LA
92	6	Oklahoma Refining	OK
92	8	Broderick Wood Products	CO
92	8	Denver Radium (Operable Unit 8)	CO
92	8	Portland Cement (Kiln Dust #2 & #3)	UT
92	8	Rocky Flats (USDOE) (Operable Unit 4)	CO
92	8	Silver Bow CreekButte Area	MT
92	9	Rhone-Poulenc/Zoecon	CA
92	10	Bunker Hill Mining and Metallurgical Complex	ID
92	10	Pacific Hide & Fur Recycling (Amendment)	ID
92	10	U.S. DOE Idaho National Engineering Lab (Operable Unit 22)	ID
93	1	Salem Acres	MA
93	2	American Cyanamid	NJ
93	2	FMC-Dublin Road	NY
93	2	Hunterstown Road	PA
93	3	Rentokil Virginia Wood Preserving	VA
93	4	Anodyne	FL
93	4	Bypass 601 Groundwater Contamination	NC
93	4	Bypass 601 Groundwater Contamination (Amendment)	NC
93	4	Cedartown Industries	GA
93	4	Geiger (C&M Oil) (Amendment)	SC
93	4	Hercules 009 Landfill	GA
93	4	Kalama Specialty	SC
93	4	Peak Oil/Bay Drum (Operable Unit 1)	FL
93	4	Peak Oil/Bay Drum (Operable Unit 3)	FL
93	4	Reeves Southeastern Galvanizing (Operable Unit 1)	FL

TABLE A-2 (continued)

REMEDIAL ACTIONS: ESTABLISHED TREATMENT TECHNOLOGIES BY FISCAL YEAR

Solidification/Stabilization (continued)

FY	REGION	SITE NAME	STATE
93	5	Reilly Tar & Chemical (Indianapolis Plant)	FL
93	6	Pab Oil & Chemical Services	LA
93	6	Weldon Spring Quarry/Plant/Pits (USDOE)	MO
93	8	Rocky Mountain Arsenal (Operable Unit 28)	CO
93	8	Utah Power & Light/American Barrel	UT
93	8	McColl	CA
93	9	Sacramento Army Depot	CA
93	10	American Crossarm & Conduit	WA
93	10	Umatilla Army Depot (Operable Unit 1)	OR

Other

FY	REGION	SITE NAME	STATE	TECHNOLOGY
85	6	Triangle Chemical	TX	Soil Aeration
87	3	West Virginia Ordnance	WV	In situ Flamming
88	3	Bendix Flight System	PA	Soil Aeration
88	7	Arkansas City Dump	KS	Chemical
89	9	Intel, Mountain View	CA	Soil Aeration
89	9	Raytheon, Mountain View	CA	Soil Aeration
90	4	Howe Valley Landfill	KY	Soil Aeration
92	3	Fike Chemical	WV	Neutralization
92	6	Double Eagle Refinery	OK	Neutralization
92	6	Fourth Street Abandoned Refinery	OK	Neutralization
92	6	Oklahoma Refining	OK	Neutralization
93	4	Kalama Specialty	SC	Soil Aeration

Solidification/Stabilization (continued)

FY	REGION	SITE NAME	STATE

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Appendix B
Innovative Technologies at Superfund Removal Actions

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TABLE B-1

REMOVAL ACTIONS: SITE-SPECIFIC INFORMATION BY INNOVATIVE TREATMENT TECHNOLOGY

Table B-1 is the principal part of this chapter. It contains the most detailed, site-specific information for removal sites for which innovative treatment technology has been selected. The columns of Table B-1 present the following information:

Region

This column indicates the EPA Region in which the site is located.

Site Name, State, Action Memo Date

This column identifies the site and the operable unit for which an innovative treatment technology was selected.

An action memorandum documents the selection of remedy in the removal program. The date shown in this column is the date on which an action memorandum was signed by an EPA official.

An asterisk (*) in this column indicates that a treatability study has been completed for this technology at the particular site.

Specific Technology

The second column describes the specific technology selected within a general category of innovative treatment. For example, within the general category of bioremediation, the specific technologies of land treatment or slurry-phase bioremediation may be chosen.

Site Description

This column provides information on the industrial source of the contamination at the site and allows analysis of the selection of innovative technologies by site type. For example, by using the information in this column, one may determine the most frequently selected innovative technology for wood preserving sites.

Media (quantity)

This column provides information on the media and quantity of material to be treated. If a treatment is used in situ, an effort has been made to include the maximum depth of the treatment to provide the reader with another parameter significant to the application.

TABLE B-1 (Continued)

Key Contaminants Treated

The major contaminants or contaminant groups targeted by the treatment technology are shown in this column. There may be other contaminants as well that will be treated. Other contaminants that may be present, but that are not being addressed by the listed technology, are not included.

Status

This column indicates the status of the application of the innovative treatment technology. **Predesign** indicates that the ROD has been signed but design has not begun. During predesign, EPA may be negotiating with the potentially responsible parties, procuring the services of a design firm, or collecting information (such as conducting a treatability study) needed in the design stage. If a project is in **design**, the engineering documents needed to contract for and build the remedy are being prepared. If a remedy is **being installed**, the lead agency has signed a contract for the construction work needed to set up the remedy. The remedy is **operational** if it is completely installed and it is now being operated as a treatment system; the remedy is **completed** if the goals of the ROD or decision document for that treatment technology have been met and treatment has ceased.

One purpose of this column is to identify opportunities for vendors to become involved in the next phase of the projects. Whenever possible, the season and year that the current phase will end is given. This information is identified as the "completion planned" date.

Lead Agency, Treatment Contractor

The "lead" indicates whether federal dollars are to be used to implement the remedy (Fund lead) or the potentially responsible parties will conduct the remedy with EPA/State oversight (PRP lead). If a remedy is Fund lead, EPA may manage the design/construction through its contractors, the state may manage the project with Superfund dollars, or the U.S. Army Corps of Engineers (USACE) may act for EPA to manage the design or construction. Whichever agency or organization is responsible for managing the remedy, the contractor responsible for the actual installation and operation of the innovative technology also is identified, if the lead agency has selected a contractor.

Contacts/Phone

This final column provides the names and telephone numbers of useful contacts for the site or technology. The first name listed is usually the EPA on-scene coordinator (OSC) responsible for the site. If a remedy is being managed by the state, the name and phone number of the state RPM also is provided. Information on any other useful contacts is provided.

Table B-1
Removal Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (Ex situ)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
2	GCL Tie and Treating, NY Emergency Response	Composting	Wood preserving	Soil (4,800 cy)	PAHs (Creosote)	In design; Pilot study completed in Jan 1994	Federal lead/Fund Financed; ERT/REAC	Joe Cosentino 908-906-6983 Carlos Ramos 212-264-5636
4	Southeastern Wood Preserving, MS Emergency Response (Action Memo signed 09/30/90) See also Soil Washing	Slurry phase (preceded by soil washing)	Wood preserving	Soil (12,000 cy)	PAHs (Creosote)	Completed; September 1994	Federal lead/Fund Financed; OHM Remediation Services Corp	Don Rigger 404-347-3931
5	Indiana Wood Treating, IN Emergency Response (Action Memo signed 10/11/92)	Composting	Wood preserving	Soil (18,000 cy)	PAHs (Creosote)	Operational; Completion planned Fall 1994; After 6 months 8 of 9 compost piles below treatment target levels.	Federal lead/Fund Financed; IT Corporation, CMC, Inc. - subcontractor	Steve Faryan 312-353-9351
6	MacMillan Ring Free Oil Company*, AR Emergency Response (Action Memo signed 11/09/92)	Solid phase	Petroleum refining	Sediments (38,000 cy)	VOCs (BTEX), PAHs (DAF Float)	Being installed; project completion date planned Fall 1995	Federal lead/Fund Financed; Reidel Environmental Services	Charles Fisher 214-655-2224
7	Scott Lumber, MO Emergency Response (Action Memo signed 07/10/87)	Land treatment	Wood preserving	Soil (16,000 cy)	SVOCs (Phenols, PAHs Benzo(a)pyrene)	Completed; Operational from 1987 to Fall 1991	Federal lead/Fund Financed; Remediation Technologies	Bruce Morrison 913-551-5014

Bioremediation (Ex situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
9	Poly-Carb, NV Emergency Response (Action Memo signed 05/14/87) See also Soil Washing	Land treatment	Commercial waste management	Soil (1,500 cy)	SVOCs (Phenols), PAHs (Cresol)	Completed; Operational from 7/87 to 8/88	Federal lead/Fund Financed; Reidel Environmental Services	Bob Mandel 415-744-2290

Table B-1
Removal Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (In situ)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	CSX McCormick Derailment Site, SC Emergency Response See also Soil Vapor Extraction	In situ groundwater	Derailment (30,000 gallon spill)	Groundwater down to 40 feet deep	VOCs (BETX)	Operational	PRP lead/Federal oversight; Kemron	Steve Spurlin 404-347-3931
6	Baldwin Waste Oil, TX Emergency Response (Action Memo signed 07/01/92)	In situ soil	Waste oil recycler	Soil (550 cy) down to 1 foot	VOCs (BTEX), PAHs (TPH)	Completed; September 1994	Federal lead/Fund Financed; Ecology & Environment, RSKERL (EPA), Reidel Environmental	Gary Guerra 214-665-6608
9	Gila River Indian Reservation, AZ Emergency Response (Action Memo signed 07/31/84) See also Chemical Treatment	In situ soil Preceded by chemical treatment	Drum storage/ disposal	Soil (3,200 cy)	Biocides (Toxaphene, Ethyl and Methyl Parathion)	Completed; Operational from 6/85 to 10/85	PRP lead/Federal oversight	Richard Martin 414-744-2288
9	Roseville Drums, CA Emergency Response (Action Memo signed 03/03/88)	In situ soil	Midnight dump on dirt road	Soil (14 cy)	SVOCs (Dichlorobenzene, Phenols)	Completed; Fall 1988; Operational from 2/88 to 11/88	Federal lead/Fund Financed	Brad Shipley 415-744-2287

Table B-1
Removal Actions: Site-specific Information By Technology Through FY 1993

June 1994

Chemical Treatment

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
2	Vineland Chemical, NJ Emergency Response (Action Memo signed 09/28/92)	Chemical Treatment	Pesticide manufacturing/use/ storage	Solids (100 lb)	Metals (Mercury)	Completed; December 1992; This portion of the site is completed. Remedial action for the whole site will be done by April 1994	Federal lead/Fund Financed; Ensco	Don Graham 908-321-4345 Steve Brawley (Ensco) 706-278-1195
2	Zschiegner Refining Company, NJ Emergency Response	Chemical Treatment	Precious metal recovery	Solids (100 lb)	Metals (Mercury)	Completed; Summer 1993; Operational from 2/93 to 6/93. Removal action completed. Other part going on.	Federal lead/Fund Financed; Ensco	Dilshad Perera 908-321-4356 Steve Brawley (Ensco) 706-278-1195
3	Avtex Fibers, VA Emergency Response (Action Memo signed 11/14/89)	Chemical Treatment	Rayon manufacturing facility/ wastewater treatment	Sludge (39,000 gl)	Organics (Carbon disulfide)	Completed; August 1991	Federal lead/Fund Financed; OH Materials	Vincent Zenone 215-597-3038 Bonnie Gross 215-597-0491
5	PBM Enterprises (Van Dusen Airport Service), MI Emergency Response (Action Memo signed 04/10/88)	Oxidation Sodium Hypochlorite	Silver recovery facility	Solids Cyanide tainted X-ray chips	Organic cyanides	Completed; Operational from 5/85 to 10/85	Federal lead/Fund Financed; American Environmental Service, Inc.	Ross Powers 313-692-7661

Table B-1
Removal Actions: Site-specific Information By Technology Through FY 1993

June 1994

Chemical Treatment (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
8	Mouat Industries*, MT Emergency Response (Action Memo signed 09/20/91)	Reduction using sulfuric acid and ferrous sulfate	Metal ore mining and smelting	Soil (47,000 cy)	Metals (Chromium IV)	Operational; Completion planned Spring 1994; Operation started June 1993	PRP lead/Federal oversight; Baker Environmental	Ron Bertran 406-449-5720
9	Gila River Indian Reservation, AZ Emergency Response (Action Memo signed 07/31/84) See also Bioremediation (In Situ)	Reduction using sodium hydroxide	Drum storage/ disposal	Soil (3,200 cy)	Biocides (Toxaphene, Ethyl and Methyl Parathion)	Completed; Operational from 4/85 to 10/85	Federal lead/Fund Financed	Richard Martin 414-744-2288
9	Stanford Pesticide #1, AZ Emergency Response (Action Memo signed (04/20/87)	In situ	Pesticide manufacturing/use/ storage, Farm equipment storage	Soil (200 cy)	Biocides (Methyl Parathion)	Completed; Operational from 7/87 to 9/87	Federal lead/Fund Financed; Crosby and Overton	Dan Shane 415-744-2286

Table B-1
Removal Actions: Site-specific Information By Technology Through FY 1993

June 1994

Dechlorination

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
2	Signo Trading/Mt. Vernon, NY Emergency Response (Action Memo signed 12/19/86)	Dechlorination	Waste management facility warehouse	Sludge (15 gl)	Dioxins (2,3,7,8 TCDD-laden herbicides)	Completed; Completed in 1987	Federal lead/Fund Financed; Galson Research Corp (subcontractor to OHM)	Charles Fitzsimmons 908-321-6608
7	Crown Plating, MO Emergency Response (Action Memo signed 08/29/89)	Dechlorination	Electroplating	Liquid (55 gl)	Biocides (silvex; 2,4,5 TP)	Completed; Operational from 10/89 to 12/89	Federal lead/Fund Financed	Mark Roberts 913-236-3881

Table B-1
Removal Actions: Site-specific Information By Technology Through FY 1993

June 1994

In situ Vitrification

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
5	Parsons Chemical (ETM Enterprise), MI Emergency Response (Action Memo signed 09/21/90)	In situ Vitrification	Agricultural chemical facility	Soil (3,000 cy)	Biocides, Dioxins, Metals (Mercury)	Completed; First full-scale application of in situ vitrification at a hazardous waste site	Federal lead/Fund Financed; Geosafe Corp.	Len Zintak 312-886-4246

Table B-1
Removal Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Vapor Extraction

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	Basket Creek Surface Impoundment*, GA Emergency Response (Action Memo signed 04/11/91)	Soil vapor extraction ex situ, used on a soil pile	Surface impoundment used for disposal of solvents	Soil (2,000 cy)	VOCs (TCE, PCE, MEK, MIBK, Toluene, Xylene, Benzene)	Completed	Federal lead/Fund Financed; OHM	Don Rigger 404-347-3931 Extn-6140
4	CSX McCormick Derailment Site, SC Emergency Response See also Bioremediation (In Situ)	Soil vapor extraction with air flushing	Derailment (30,000 gallon spill)	Soil (200,000 cy) down to 8 feet deep	VOCs (BETX)	Completed; Operation completed Winter 1993	PRP lead/Federal oversight; Midwest Research Institute	Steve Spurlin 404-347-3931
4	Hinson Chemical, SC Emergency Response (Action Memo signed 11/28/88)	Soil vapor extraction with air flushing	Waste reclaiming facility	Soil (60,000 cy) to a depth of 50 feet	VOCs	Completed; March 1992; Operational from 12/88 to 3/92	Federal lead/Fund Financed; OH Materials	Fred Stroud 404-347-3136
8	Mystery Bridge Road/Highway 20, OU 2*, WY Emergency Response (Action Memo signed See also Other Technologies	Soil vapor Extraction	Natural gas compressor station	Soil (160,000 cy) approximately 5 acres down to 20 feet	VOCs (Benzene)	Operational	PRP lead/Federal oversight; Adrian Brown Consultants	Lisa Reed 303-293-1515

Table B-1
Removal Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Washing

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	Southeastern Wood Preserving, MS Emergency Response (Action Memo signed 09/30/90) See also Bioremediation (Ex Situ)	Soil washing (sand removal, followed by bioremediation of fines	Wood preserving	Sludge (quantity unknown), Solids (1,000 cy)	SVOCs, PAHs (Creosote)	Operational; Completion planned Spring 1994	Federal lead/Fund Financed; OHM Remediation Services Corp.	Don Rigger 404-347-3931
9	Poly-Carb, NV Emergency Response (Action Memo signed 05/14/87) See also Bioremediation (Ex Situ)	Soil Washing	Commercial waste management	Soil (1,500 cy)	SVOCs (Phenols), PAHs (Cresol)	Completed; Operational 7/87 to 8/88	Federal lead/Fund Financed; Reidel Environmental Services	Bob Mandel 415-744-2290

Table B-1
Removal Actions: Site-specific Information By Technology Through FY 1993

June 1994

Thermal Desorption

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	FCX-Washington Site, NC Emergency Response (Action Memo signed 12/04/91)	Thermal Desorption	Pesticide manufacturing/use/ storage	Soil (15,000 cy)	Biocides (Chlordane, Methoxyclor, DDT, DDE)	Being installed	Federal lead/Fund Financed	Paul Peronard 404-347-6121
10	Drexler - RAMCOR*, WA Emergency Response (Action Memo signed 09/30/91)	Thermal Desorption	Waste oil recycler	Soil (3,000 cy)	VOCs (BTEX), PAHs (Petroleum hydrocarbons)	Completed; Operational from 7/92 to 8/92	Federal lead/Fund Financed; Four Seasons	Chris Field 206-553-1674

Table B-1
Removal Actions: Site-specific Information By Technology Through FY 1993

June 1994

Other

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
8	Mystery Bridge Road/Highway 20, OU 2*, WY Emergency Response See also Soil Vapor Extraction	Air sparging	Natural gas compressor station	Soil (160,000 cy)	VOCs (Benzene)	Operational	PRP lead/Federal oversight; Adrian Brown Consultants	Lisa Reed 303-293-1515

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Appendix C
Innovative Technologies at Actions Under Other Federal Programs

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TABLE C-1

OTHER FEDERAL PROGRAMS: SITE-SPECIFIC INFORMATION BY INNOVATIVE TREATMENT TECHNOLOGY

Table C-1 is the principal part of this chapter. It contains the most detailed, site-specific information for removal sites for which an innovative treatment technology has been selected. The columns of Table C-1 present the following information:

Region

This column indicates the EPA Region in which the site is located.

Site Name, State

This column identifies the site and the operable unit for which an innovative treatment technology was selected.

An asterisk (*) in this column indicates that a treatability study has been completed for this technology at the particular site.

Specific Technology

The second column describes the specific technology selected within a general category of innovative treatment. For example, within the general category of bioremediation, the specific technologies of land treatment or slurry-phase bioremediation may be chosen.

Site Description

This column provides information on the industrial source of the contamination at the site and allows analysis of the selection of innovative technologies by site type. For example, by using the information in this column, one may determine the most frequently selected innovative technology for wood preserving sites.

Media (quantity)

This column provides information on the media and quantity of material to be treated. If a treatment is used in situ, an effort has been made to include the maximum depth of the treatment to provide the reader with another important parameter regarding the application.

TABLE C-1 (Continued)

Key Contaminants Treated

The major contaminants or contaminant groups targeted by the treatment technology are shown in this column. There may be other contaminants as well that will be treated. Other contaminants that may be present, but that are not being addressed by the listed technology, are not included.

Status

This column gives the status of the application of the innovative treatment technology. **Predesign** indicates that the ROD has been signed but design has not begun. During predesign, EPA may be negotiating with the potentially responsible parties, procuring the services of a design firm, or collecting information (such as conducting a treatability study) needed in the design stage. If a project is in **design**, the engineering documents needed to contract for and build the remedy are being prepared. If a remedy is **being installed**, the lead agency has signed a contract for the construction work needed to set up the remedy. The remedy is **operational** if it is complete and it is now being operated as a treatment system; the remedy is **completed** if the goals of the ROD or decision document for that treatment technology have been met and treatment has ceased.

One purpose of this column is to identify opportunities for vendors to become involved in the next phase of the projects. Whenever possible, the season and year that the current phase will end is given. This information is identified as the "completion planned" date.

Lead Agency, Treatment Contractor

The "lead" indicates whether federal dollars are to be used to implement the remedy (Fund lead) or the potentially responsible parties will conduct the remedy with EPA/State oversight (PRP lead). If a remedy is Fund lead, EPA may manage the design/ construction through its contractors, the state may manage the project with Superfund dollars, or the U.S. Army Corps of Engineers (USACE) may act for EPA to manage the design or construction. Whichever agency or organization is responsible for managing the remedy, the contractor responsible for the actual installation and operation of the innovative technology also is identified, if the lead agency has selected a contractor.

Contacts/Phone

This final column gives the names and telephone numbers of useful contacts for the site or technology. The first name listed is usually the project manager or point of contact responsible for the site. If a remedy is being managed by the state, the name and

Table C-1
Other Federal Program Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (Ex situ)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
6	Matagorda Island AF Range, TX	Solid phase	Federal facility	Soil (500 cy)	VOCs (BTEX), PAHs (TPH, Tar)	Completed; Operational from 10/92 to 3/93	Army (USACE)/DoD Financed - IRP Program; CCC, Inc.	Jack Otis 409-766-3161 Domingo Galindo (USACE) 512-884-3385
8	Former Glasgow AFB, MT	Land treatment	UST removal site	Soil (2,000 cy)	VOCs, PAHs (Petroleum hydrocarbons)	Being installed; Installation completion planned Fall 1994; Design Completed. Expected construction completion date Fall 1994	ARMY (USACE)/DoD Financed FUDS Program	Martin Rasmussen (USACE, Omaha) 402-221-3827 Steve Ott (USACE, Omaha) 402-221-7670
9	Ft. Ord Marina, Fritzche AAF Fire Drill Area, CA	Land treatment	Fire drill area	Soil (4,000 cy)	VOCs (TCE, MEK), PAHs (Petroleum hydrocarbons)	Completed; Winter 1991	Army (USACE)/DoD Financed - IRP Program	Gail Youngblood 408-242-8017
9	Marine Corps., Mountain Warfare Center, Bridgeport, CA	Bioremediation (Ex Situ) Heap pile bioreactor with aeration and irrigation	Federal facility	Soil (7,000 cy)	PAHs (Petroleum hydrocarbons, Diesel)	Completed; 1989; Pilot-scale project	State Lead/Western Division of NFEC; ENSR	Bill Major 805-982-1808
10	Ft. Wainwright*, AK	Land treatment Biopile	Federal facility, fuel pipeline, aboveground storage tank	Soil (4,500 cy)	PAHs (Diesel)	Operational	Army (USACE)/DoD Financed - IRP Program; Laidlaw	Diane Soderland 907-271-5083 David Williams (USACE) 907-753-5657

Table C-1
Other Federal Program Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (In situ)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	Savannah River DOE, M Area Settling Basin, SC See also Soil Vapor Extraction, Other Technologies	In situ groundwater	Leaking solvent line	Groundwater	VOCs (TCE, PCE), PAHs ((DNAPLs))	Operational; Operation began in 1990	DOE Lead/DOE funding; Westinghouse Savannah River Company	Nate Ellis (DOE) 803-952-4846 Brian Lowry (WSRC) 803-725-5181
6	Kelly AFB, Site 1100*, TX See also Soil Vapor Extraction	In situ soil Bioventing	Federal facility (hazardous waste facility)	Soil (8,900 cy)	VOCs (JP-4)	Operational; Completion planned 1994; full scale since 1993; completion in 2 years	Kelly AFB/Air Force Funded; SAIC	Steve Escude 210-925-1812
8	Ft. Carson*, CO See also Soil Vapor Extraction	In situ soil Bioventing	UST remediation	Soil down to 80 feet	VOCs (gasoline)	Operational; completion date unknown	Army (USACE)/DoD Financed - IRP; Woodward Clyde	John Cloonan (USACE) 719-526-8004
9	Aua Fuel Farm, Aua Village, American Samoa,	Bioremediation (In Situ)	Fuel farm	Soil (quantity unknown)	PAHs (Diesel fuel)	Operational; Completion expected for Spring 1996	Army (USACE)/DoD Financed - FUDS Program	Helene Takemoto (USACE, pac div) 808-438-6931/ 1776
9	Davis Monthan AFB, AZ See also Soil Vapor Extraction	In situ soil	Federal facility JP-4 Pump House	Soil (440 cy) 400 ft by 15 ft down to 2 ft deep	PAHs (Petroleum hydrocarbons)	Completed; Operational from 7/91 to 3/92	USACE/Air Force	Mike Steffansmeyer (USACE, Omaha) 402-221-7163

Table C-1
Other Federal Program Actions: Site-specific Information By Technology Through FY 1993

June 1994

Bioremediation (In situ) (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
9	Davis Monthan AFB, Site 35, AZ See also Soil Vapor Extraction	In situ soil Bioventing	JP-4 pump house	Soil (63,000 cy)	VOCs (JP-4), PAHs	Being installed; Pilot test Winter 1994	USACE/ Air Force Funded (State Oversite); Engineering Science	Mike Steffanmeyer (USACE, Omaha) 402-221-7163 Karen Odom (USAF) 602-750-5595 Doug Dowrey (ES) 303-831-8100
9	Seal Beach Navy Weapons Station IR Site 14, CA See also Soil Vapor Extraction	Anaerobic	Federal facility Naval weapons station	Soil (1,700 cy) 100 yd diameter down to 6 feet deep	VOCs (BTEX), PAHs (Petroleum hydrocarbons)	Operational; Operations started in 1989	Navy/DoD Financed - IRP Program; Naval Facility Engineering Center (Stanford Univ.)	Laura Duchnak (Navy RPM) 619-532-3152 Steve McDonald (Navy) 310-594-7655
11	Naval Communication Station, Scotland,	In situ soil	Diesel fuel storage tanks and piping	Soil apprx.8,608 square feet (800 sq meters)	SVOCs (No.2 Diesel)	Completed; Fall 1985	Naval Civil Engineering Lab/DoD Federal; Polybac	Deh Bin Chan 805-982-4191

Table C-1
Other Federal Program Actions: Site-specific Information By Technology Through FY 1993

June 1994

Dechlorination

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
9	U. S. Public Works Center, Guam, GU	Dechlorination	Federal facility	Soil (5,500 cy) tons	PCBs	Operational; Completion planned Summer 1995	Navy; Guam EPA Oversite; IT Corp	D. B. Chan (Navy) 805-982-4191

Table C-1
Other Federal Program Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Vapor Extraction

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
3	Langley AFB, IRP Site 28, VA	Soil vapor extraction with air flushing	Federal facility	Soil 1.5 acres down to 5feet deep	VOCs (Gasoline)	Being installed; Installation completion planned Summer 1994	USACE/Air Force Funded	John Farhat (USACE, Omaha) 402-221-7654 Dan Musel (Langley AFB) 804-764-3987
4	Savannah River DOE, M Area Settling Basin, SC See also Bioremediation (In Situ), Other Technologies	Soil vapor extraction with air flushing with groundwater sparging	Leaking solvent line	Soil (450,000 lb), Groundwater down to 200 feet	VOCs (TCE, PCE)	Operational; Operation of the SVE system began in 1990	DOE Lead/DOE Funding; Westinghouse Savannah River Company	Nate Ellis (DOE) 803-952-4846 Brian Looney (WSRC) 803-725-5181
6	Holloman AFB, BX Service Station, NM	Soil vapor extraction may supplement with air injection	Service station (SS - 17)	Soil 2 to 3 acres down to 10 feet	VOCs (Benzene), PAHs (Petroleum Hydrocarbons)	In design; Design completion planned Winter 1993; Currently conducting pilot test.	USACE/Air Force IRP Program; Ensearch Environmental, Walk Haydel & Associates - Sub	Ron Stirling (USACE) 402-221-7664
6	Holloman AFB, Main POL Area, NM	Soil vapor extraction Using passive vent and extraction wells.	Former above ground fuel storage tank area (JP-4 and AV Gas spill) (SS-02/05)	Soil (quantity unknown)	VOCs (Benzene), PAHs (Petroleum Hydrocarbons)	In design; Design completed; Installation and remedation to start in Spring 1994.	USACE/Air Force IRP Program; IT	Ron Stirling (USACE) 402-221-7664

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
6	Kelly AFB, Site 1100*, TX See also Bioremediation (In Situ)	Soil Vapor Extraction	Federal facility (hazardous waste facility)	Soil (8,900 cy)	VOCs (JP-4)	Operational; Vacuum extraction done before with bioventing, information the same. Completion in 2 years.	Kelly AFB/Air Force Funded; SAIC	Steve Escude 210-925-1812
8	Ft. Carson*, CO See also Bioremediation (In Situ)	Soil Vapor Extraction	UST remediation	Soil down to 80 feet	VOCs (gasoline)	Operational; completion date unknown	Army (USACE)/DoD Financed - IRP; Woodward Clyde	John Cloonan 719-526-8004
9	Davis Monthan AFB, AZ See also Bioremediation (In Situ)	Soil vapor extraction with bioventing	Federal facility JP-4 Pump House	Soil (63,000 cy)	VOCs (JP-4, Benzene)	In design; Design completion planned Fall 1993; Completion delayed because awaiting funding	USACE/Air Force Funded; Montgomery Watson - Design Contractor	Mike Steffansmeier, USACE Omaha 402-221-7163 Karen Odom Air Force 602-750-5595
9	Davis Monthan AFB, Site 35, AZ See also Bioremediation (In Situ)	Soil vapor extraction with bioventing	JP-4 pump house	Soil (63,000 cy)	VOCs (JP-4, Benzene)	In design; Design completion planned Fall 1993	USACE/Air Force Funded; Montgomery Watson - Design Contractor	Mike Steffansmeier (USACE, Omaha) 402-221-7163

Table C-1
Other Federal Program Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Vapor Extraction (continued)

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
9	Luke AFB, AZ	Soil vapor extraction with air flushing and thermal oxidation of off gases	Air Force fire training pits	Soil (35,000 cy)	VOCs (2-hexanone, 2-butanone, 4-methyl 2-pentanone, BTEX)	Completed; Operational from 11/91 to 5/92. Will conduct long-term monitoring afterward	USACE Lead/State Oversight; Envirocon	Jerome Stolinsky (USACE) 402-221-7170 Dan McCafferty (Envirocon) 406-523-1150
9	McClellan AFB OUD, CA	Soil Vapor Extraction	Former fuel and solvent disposal site	Soil (12,000 cy)	VOCs (TCA, TCE, 1-1-DCE)	Operational; Completion planned Winter 1994; 5 years to complete.	Air Force; CH2M Hill	Steve Hodge (McClellan AFB) 916-643-0830 Elaine Anderson (McClellan AFB) 916-643-0830 Joseph Danko (CH2M Hill) 503-752-4271
9	Seal Beach Navy Weapons Station IR Site 14, CA See also Bioremediation (In Situ)	Soil vapor extraction with combustion of air emissions	Federal facility Naval weapons station	Soil (quantity unknown)	VOCs (BTEX)	In design; Operation to start in 1994	Navy/DoD Financed - IRP Program; Jacobs Engineering	Jeff Kidwell (Navy) 619-532-2058 Steve McDonald (Navy) 310-594-7655

Table C-1
Other Federal Program Actions: Site-specific Information By Technology Through FY 1993

June 1994

Soil Washing

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
5	Saginaw Bay Confined Disposal Facility, MI	Soil Washing	Confined disposal island	Sediments (150 cy)	PCBs	Completed; Summer 92	COE lead/Federal Oversite; Bergmann, USA	Jim Galloway (COE) 313-226-6760 Rick Traver (Bergmann) 203-684-6844
5	Twin Cities Army Ammunition Plant, MN	Soil Washing	Munitions manufacturing/ storage	Soil (quantity unknown)	Metals (Lead, Mercury)	Operational; Completion planned Summer 1994	Federal Facility/State oversight; Wenck Associates, Inc.	Peter Rissel (US Army Env. Center) 410-671-1504 Martin McCleery (Twin Cities AAP)

Table C-1
Other Federal Program Actions: Site-specific Information By Technology Through FY 1993

June 1994

Other

Region	Site Name, State, (ROD Date)	Specific Technology	Site Description	Media (Quantity)	Key Contaminants Treated	Status#	Lead Agency and Treatment Contractor (if available)	Contacts/Phone
4	Savannah River DOE, M Area Settling Basin, SC See also Bioremediation (In Situ), Soil Vapor Extraction	air sparging	Leaking solvent line	Groundwater	VOCs (TCE, PCE)	Operational; Operational since 1990	DOE lead/DOE funding; Westinghouse Savannah River Company	Nate Ellis (DOE) 803-952-4846 Brian Lowry (WSRC) 803-725-5181

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Appendix D
Summary of Status Report Updates, Changes, Deletions

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Summary of Updates/Changes/Deletions

Each edition of this report has added new information on the applications of innovative technologies at Superfund sites and has updated the status of existing innovative projects. The information added from ROD's from previous fiscal years that was deleted, or changed in each edition (from the first edition of the report published in January 1991 through this 5th edition) is described below to allow tracking of specific projects from edition to edition.

Additions, Changes, and Deletions from the 1st edition report (January 1991) to the 2nd edition report (September 1991).

Region	Site Name, State (ROD Date)	Technology (Listed in 1st Edition)	2nd Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
3	Leetown Pesticides, WV (03/31/86)	Bioremediation		Yes		No further action. Risk re-evaluated and was determined that risk was not sufficient for remedial action.	Andy Palestini 215-597-1286 Philip Rotstein 215-597-9023
3	Harvey-Knott Drum, DE (09/30/85)	In Situ Soil Flushing		Yes		During remedial design, sampling indicated VOCs were no longer present in the soils. Heavy metals remained at the surface. An ESD was issued on 12/92. Remedy will consist of capping the site.	Kate Lose 215-597-0910
2	SMS Instruments (Deer Park), NY (09/29/89)	Thermal Desorption		Yes (changed to soil vapor extraction in 3rd edition)		Misinterpretation of ROD during ROD analysis	Miko Fayon 212-264-4706
1	Re-Solve, MA (09/24/87)	Chemical Treatment			Dechlorination	Reclassified technology	Lorenzo Thantu 617-223-5500
2	GE Wiring Services, PR (09/30/88)	Chemical Extraction			Soil Washing	Reclassified technology	Caroline Kwan 212-264-0151
6	Sol Lynn/Industrial Transformers, TX (03/25/88)	Chemical Treatment			Dechlorination	Reclassified technology	John Meyer 214-655-6735
10	Northwest Transformer, WA (09/15/89)	In Situ Vitrification		Yes		Technology dropped because commercial availability was delayed	Christine Psyk 206-553-6519

Note: The 2nd edition report also added information on 45 innovative treatment technologies selected for remedial actions in FY 1990 RODs and 18 innovative treatment technologies used in removal actions.

Additions, Changes, and Deletions from the 2nd edition report (September 1991) to the 3rd edition report (April 1992).

Region	Site Name, State (ROD Date)	Technology (Listed in 2nd Edition)	3rd Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
2	Marathon Battery, NY (09/30/88)	Thermal Desorption		Yes		During design soil gas concentration at hot spots was below NY state standards. GW monitoring will continue.	Pam Tames 212-264-1036
2	Goose Farm, NJ (09/27/85)	In Situ Soil Flushing		Yes		Incorrectly classified. Actually conducting pump and treat with treated water being reinjected	Laura Lombardo 212-264-6989
2	GE Wiring Services, PR (09/30/88)	Soil Washing			Thermal Desorption	Possible pre-wash of debris with surfactants	Caroline Kwan 212-264-0151
4	Coleman-Evans Wood Preserving, FL (09/26/90)	Soil Washing		Yes		Problems due to the presence of furans. Incineration likely	Tony Best 404-347-2643
5	Sangamo/Crab Orchard National Wildlife Refuge, IL (08/01/90)	In Situ Vitrification		Yes	Incineration	ROD specified the remedy as in situ vitrification or incineration. Incineration was chosen	Nan Gowda 312-353-9236
5	Anderson Development, MI (09/28/90)	In Situ Vitrification			Thermal Desorption	Because of concern by the community the remedy was changed. ROD amendment signed 9/30/91, and ESD was signed 10/2/92	Jim Hahnenberg 312-353-4213
5	U.S. Aviex, MI (09/07/88)	In Situ Flushing		Yes		Cleanup levels reached by natural attenuation	Robert Whippo 312-886-4759
6	Atchison/Santa Fe/Clovis, NM (09/23/88)	Bioremediation (ex situ)		Yes			Ky Nichols 214-655-6783
6	Crystal Chemical, TX (09/27/90)	In Situ Vitrification		Yes		Remedy reconsidered after delay in commercial availability of technology. Vitrification considered for hot spots only. Revised remedy will consist of capping and off-site disposal/consolidation of soils.	Lisa Price 214-655-6735
9	Solvent Service, CA (09/27/90)	Bioremediation (in situ)		Yes		ROD was misinterpreted during ROD analysis	Kevin Graves 510-286-0435 Steve Morse (CA) 570-286-0304

Note: The 3rd edition report also added information on 70 innovative treatment technologies selected for remedial actions in FY 1991 RODs.

Region	Site Name, State (ROD Date)	Technology (Listed in 2nd Edition)	3rd Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
9	Poly Carb, NV (Removal)	Bioremediation (ex situ)			Bioremediation (in situ)	Reclassified technology	Bob Mandel 415-744-2290

Additions, Changes, and Deletions from the 3rd edition report (April 1992) to the 4th edition report (October 1992).

Region	Site Name, State (ROD Date)	Technology (Listed in 3rd Edition)	4th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
2	Lipari Landfill Marsh Sediment, NJ (07/11/88)	None	Thermal Desorption			Missed during original ROD analysis	Tom Graff 816-426-2296
2	GE Wiring Services PR (09/30/88)	Thermal Desorption			Soil Washing		Caroline Kwan 212-264-0151
5	University of Minnesota, MN (06/11/90)	Thermal Desorption		Yes	Incineration in 5th edition	Issued an ESD in August 1991 to change remedy to Thermal Desorption or Incineration. Incineration was chosen because it was less expensive	Darrel Owens 312-886-7089
6	Sol Lynn/Industrial Dechlorination Transformers, TX (03/25/88)	Dechlorination		Yes		Discontinued due to implementation difficulties	John Meyer 214-655-6735
6	Koppers/Texarkana, TX (09/23/88)	Soil Washing	In Situ Flushing			Remedy added by ROD amendment	Ursula Lennox 214-655-6735
9	Poly Carb, NV (Removal)	Bioremediation (in situ)			Bioremediation (ex situ)	Reclassified technology	Bob Mandel 415-744-2290
9	Teledyne Semiconductors, CA (03/22/91)	Soil Vapor Extraction		Yes		Mistakenly deleted from report	Sean Hogan 415-744-2233
10	Gould Battery (03/31/88)	Soil Washing	Soil Washing			Missed during original ROD analysis	Chip Humphries 503-326-2678

Note: The 4th edition report also added information on 10 innovative treatment technologies selected for remedial action in FY 1992 RODs, and 21 innovative treatment technologies at non-Superfund sites.

Additions, Changes, and Deletions from the 4th edition report (October 1992) to the 5th edition report (September 1993).

Region	Site Name, State (ROD Date)	Technology Listed in 4th Edition	5th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
1	Re-Solve, MA (09/24/87)	Dechlorination		Yes		Pilot study showed that dechlorination increased the volume and that the waste still needed to be incinerated. An ESD to incinerate residuals off-site is in peer review.	Joe Lemay 617-573-9622
1	Pinette's Salvage Yard, ME (05/30/89)	Solvent Extraction		Yes		Will incinerate off-site	Ross Gilleland 617-573-5766
2	Naval Air Warfare Center, OU 1, NJ (02/04/91)	In Situ Flushing		Yes		Remedy involves pump and treat with on-site discharge. Soil is not being targeted.	Jeff Gratz 212-264-6667
2	Naval Air Warfare Center, OU 2, NJ (02/04/91)	In Situ Flushing		Yes		Remedy involves pump and treat with on-site discharge. Soil is not being targeted.	Jeff Gratz 212-264-6667
2	Naval Air Warfare Center, OU 4, NJ (02/04/91)	In Situ Flushing		Yes		Remedy involves pump and treat with on-site discharge. Soil is not being targeted.	Jeff Gratz 212-264-6667
2	Caldwell Trucking, NJ (09/25/86)	Thermal Desorption		Yes		Thermal desorption not needed because highly contaminated soil will be incinerated off-site instead. Remainder will be stabilized. ESD issued.	Ed Finnerty 212-264-3555
3	Tobylanna Army Depot, PA (Non-Superfund project)	Bioremediation (in situ)		Yes		Will conduct ex situ passive volatilization	Drew Lausch 215-597-3161 Ross Mantione (Tobyhanna) 717-894-6494

Note: The 5th edition report also adds information on 49 innovative treatment technologies selected for remedial actions in FY 1992 RODs, and 15 innovative treatment technologies used in removal actions.

Additions, Changes, and Deletions from the 4th edition report (October 1992) to the 5th edition report (September 1993). (continued)

Region	Site Name, State (ROD Date)	Technology Listed in 4th Edition	5th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
4	Smith's Farm Brooks (09/30/91)	Dechlorination	Thermal Desorption			Will alter chemistry to achieve dechlorination during thermal desorption.	Tony DeAngelo 404-347-7791
4	American Creosote Works, FL (09/28/89)	Soil Washing		Yes		Bench-scale study of soil washing showed that the concentrations of carcinogenic PAHs were not adequately reduced. Also discovered dioxins at much higher concentrations	Mark Fite 404-347-2643
4	American Creosote Works, FL (09/28/89)	Bioremediation (Ex Situ)		Yes		Bench-scale study of bioremediation (ex situ) showed that the concentrations of carcinogenic PAHs were not adequately reduced. Also discovered dioxins at much higher concentrations	Mark Fite 404-347-2643
4	Hollingsworth Solderless, FL (04/10/86)	None	Soil Vapor Extraction			Listed as soil aeration in 3rd edition	John Zimmerman 404-347-2643
5	Cliffs/Dow Dump, MI (09/27/89)	Bioremediation (In Situ)		Yes		Bioremediation (in situ) was a misinterpretation of the ROD. All soil will be excavated and treated by bioremediation (ex situ).	Ken Glatz 312-886-1434
6	Tenth Street Dump/Junkyard, OK (09/27/90)	Dechlorination		Yes		Remedy has been suspended because of implementation difficulties and escalating cost. Cost doubled from cost projected in ROD. Issuing ROD amendment to cap in place.	Mike Overbay 214-655-8512
7	Fairfield Coal & Gas, IA (09/21/90)	Bioremediation (in situ)		Yes		Pilot study showed in situ bioremediation was too costly. It appears that the present pump and treat system will be able to achieve cleanup levels.	Bruce Morrison 913-551-7755

Additions, Changes, and Deletions from the 4th edition report (October 1992) to the 5th edition report (September 1993). (continued)

Region	Site Name, State (ROD Date)	Technology Listed in 4th Edition	5th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
8	Sand Creek Industrial OU 5, CO (09/28/90)	Soil Washing			Thermal Desorption	Soil washing did not meet performance standards and was expensive. ROD amendment issued early September 1993.	Erna Acheson 303-294-1971
9	Koppers Company (Oroville), CA (04/04/90)	Bioremediation (Ex Situ)		Yes		Misinterpretation of ROD during ROD analysis	Fred Schlauffler 415-744-2365
9	Signetics (AMD 901) TRW OU, CA (09/11/91)	None	Soil Vapor Extraction			Remedy added	Joe Healy 415-744-2331 Kevin Graves (CA) 510-286-0435
9	Teledyne Semiconductors, CA (09/30/91)	None	Soil Vapor Extraction			Dropped by mistake from 4th edition	Sean Hogan 415-744-2233
10	IDEL Warm Waste Pond, ID (12/05/91)	Acid Extraction		Yes		Treatability study of acid extraction did not achieve good extraction rates. Did not reduce the volume of waste. Will excavate, consolidate and cap.	Linda Meyer 206-553-6636 Nolan Jenson (DOE) 208-526-0436
10	IDEL Warm Waste Pond, ID (12/05/93)	Soil Washing		Yes		Treatability study of soil washing did not achieve results. Did not reduce the volume of waste. Will excavate, consolidate and cap.	Linda Meyer 206-553-6636 Nolan Jenson (DOE) 208-526-0436

Additions, Changes, and Deletions from the 5th edition report (September 1993) to the 6th edition report (September 1994).

Region	Site Name, State (ROD Date)	Technology Listed in 5th Edition	6th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
1	Union Chemical Co., OU 1, ME (12/27/90)	Thermal Desorption			Soil Vapor Extraction	Determined that SVE would be more cost effective. ESD signed March/April 1994.	Terry Connelly 617-573-9638 Christopher Rushton (ME DEP) 207-287-2651
1	Tibbetts Road, NH (09/29/92)	In Situ Soil Flushing		Yes		Misinterpretation of ROD during ROD analysis. Soil was not targeted for treatment.	Darryl Luce 617-573-5767 Mike Robinette (NH) 603-271-2014
2	Ewan Property, OU2, NJ (09/29/89)	Soil Washing, Solvent Extraction		Yes		Re-evaluation of site found significantly less contaminated soil than original estimates. Soil will be disposed off site. ESD signed July 1994.	Kim O'Connell 212-264-8127 (temporary)
2	Naval Air Engineering Center, OU 7, Interim Action, NJ (03/16/92)	In Situ Flushing		Yes		Misinterpretation of the ROD during ROD analysis.	Jeff Gratz 212-264-6667 Robert Wing 212-264-8670
2	Solvent Savers, NY (09/30/90)	Soil Vapor Extraction		Yes		SVE is a secondary remedy which may be used instead of thermal desorption, the primary remedy, if treatability studies show to be effective.	Lisa Wong 212-264-9348
3	U.S. Titanium, VA (11/21/89)	In Situ Flushing			Neutralization with lime (Ex Situ)	Treatability studies indicated that the technology was not feasible. ESD under preparation.	Vance Evans 215-597-8485 Jeff Howard (VA) 804-762-4203
3	L.A. Clarke & Sons, OU 1 (Soils), VA (03/31/88)	Bioremediation (In Situ)		Yes		Facility no longer in operation. Can now excavate. Remedies being considered include thermal desorption.	Andy Palestini 215-597-1286

Note: The 6th edition report also adds information on 53 innovative treatment technologies selected for remedial actions in FY 1993 RODs.

Additions, Changes, and Deletions from the 5th edition report (September 1993) to the 6th edition report (September 1994). (continued)

Region	Site Name, State (ROD Date)	Technology Listed in 5th Edition	6th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
3	L.A. Clarke & Sons, OU 1 (Soils), VA (03/31/88)	In Situ Flushing		Yes		Facility no longer in operation. Can now excavate. Remedies being considered include thermal desorption.	Andy Palestini 215-597-1286
3	L.A. Clarke & Sons, Lagoon Sludge OU, VA (03/31/88)	Bioremediation (Ex Situ)			Re-use as fuel off-site	Technology changed because of uncertainty about the ability of bioremediation to reach treatment goals. ESD signed 3/94.	Andy Palestini 215-597-1286
3	Henderson Road, PA (06/30/88)	Soil Vapor Extraction		Yes		Only conducted air injection to facilitate pump and treat. Vapors were not extracted. Further investigation revealed that the Vadose Zone was not an area of concern.	Joe McDowell 215-597-8240
4	Cabot Carbon/Koppers (Groundwater), FL (09/27/90)	Bioremediation (In Situ Groundwater)		Yes		Groundwater not being treated. Only soil is being treated.	Patsy Goldberg 404-347-6265
4	Benfield Industries, NC (07/31/92)	Soil Washing Bioremediation Slurry phase			Land Treatment	Land treatment determined to be more cost effective.	Jon Bornholm 404-347-7791
4	Charles Macon Lagoon, Lagoon #10, NC (09/31/91)	Bioremediation (Ex Situ)		Yes		Treatability study indicated that the technology could not treat the contaminants of concern because of materials problems. Will excavate and dispose off-site. ROD Amendment signed 3/94.	Geizelle Bennett 404-347-7791 David Lown (NC) 919-733-2801
4	Palmetto Wood Preserving, SC (09/30/87)	Chemical Treatment		Yes		Waste will be disposed off-site more cost effectively	Al Cherry (404) 342-7791
4	Arlington Blending & Packaging Co., OU1, TN (06/28/91)	Dechlorination		Yes		Another disposal method likely to be used.	Derek Matory 404-347-7791

Note: The 6th edition report also adds information on 53 innovative treatment technologies selected for remedial actions in FY 1993 RODs.

Additions, Changes, and Deletions from the 5th edition report (September 1993) to the 6th edition report (September 1994). (continued)

Region	Site Name, State (ROD Date)	Technology Listed in 5th Edition	6th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
5	South Andover Salvage Yard, OU 2, MN (12/24/91)	Bioremediation (Ex Situ)		Yes	Thermal Treatment	Technology changed to off-site thermal treatment (either thermal desorption or incineration) because of reduced volume of contamination found during RD investigations. ROD amendment signed 5/31/94.	Bruce Sypniewski 312-886-6189
5	Allied Chem & Ironton Coke, OU 2, OH (12/28/90)	Bioremediation (In Situ)	Bioremediation (Ex Situ) (Land Farming)			Adding technology to treat more highly contaminated soil.	Tom Alcamo 312-886-7278
5	Allied Chem & Ironton Coke, OU 2, OH (12/28/90)	Bioremediation (In Situ)	Bioremediation (Ex Situ) Magnetically Enhanced Land Farming			Adding technology to treat more highly contaminated soil.	Tom Alcamo 312-886-7278
5	United Scrap Lead/SIA, OH (09/30/88)	Soil Washing		Yes		Determined to be too expensive. Other alternatives being evaluated. ROD Amendment planned.	Anita Boseman 312-886-6941 Timothy Hull (OH) 513-285-6357
5	MacGillis and Gibbs Co./Bell Lumber and Pole Co., MN (12/31/92)	Soil Washing and Bioremediation (ex situ) of fines		Yes	Incineration on-site	Incineration was contingency remedy in ROD. State had concerns about effective means of soil washing and cost of incineration has decreased; ESD will be signed Fall 1994.	Daryl Owens 312-886-7089
6	Fruitland Drum, NM (09/08/90)	Dechlorination			Incineration (Off-site)	Dechlorination not being pursued because of cost considerations.	Gregory Fife 214-655-6773
6	Holloman AFB, Main POL Area, NM	Bioremediation (In Situ) (Groundwater)		Yes		Groundwater remediation not planned for this area.	Ron Stirling (USACE) 402-221-7664

Note: The 6th edition report also adds information on 53 innovative treatment technologies selected for remedial actions in FY 1993 RODs.

Additions, Changes, and Deletions from the 5th edition report (September 1993) to the 6th edition report (September 1994). (continued)

Region	Site Name, State (ROD Date)	Technology Listed in 5th Edition	6th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
6	Holloman AFB, Main POL Area, NM	Air Sparging		Yes		Groundwater remediation not planned for this area.	Ron Stirling (USACE) 402-221-7664
6	South Valley, NM (09/30/88)	Soil Vapor Extraction		Yes		Determined there was insignificant concentration to warrant remediation. No further action.	Bert Gorrod 214-655-6779
6	Tinker AFB (Soldier Creek Bldg. 3001), OK (08/16/90)	Soil Vapor Extraction		Yes		Determined that SVE was not viable. No alternative selected at this point.	Susan Webster 214-655-6784 Major Richard Ashworth (USAF) 405-734-3058
8	Rocky Mountain Arsenal, M-1 Basins (OU 16), CO (02/26/90)	In Situ Vitrification		Yes		Remedy cancelled due to problems with contractor. New ROD being negotiated.	Connally Mears 303-293-1528
8	Portland Cement Co. (Kiln Dust No. 2 and No. 3) OU2, UT (03/31/92)	Chemical Treatment		Yes		Not considered innovative	Mike McCeney 303 293-1526
9	Mesa Area Ground Water Contamination, AZ (09/27/91)	Soil Vapor Extraction		Yes		Removed from NPL, deferred to the State	Maurice Chait 602-962-2187 Richard Oln 602-207-4176
9	Castle Air Force Base, OU 1, CA (09/30/91)	Bioremediation (In Situ Groundwater)		Yes	Pump and Treat with Air Stripping	Bench-scale test indicated that the technology did not work. No ESD or ROD amendment being issued.	David Roberts 415-744-1487 Brad Hicks (USAF) 209-726-4841
9	Teledyne Semi Conductors, CA (03/22/91)	Soil Vapor Extraction		Yes		Misintrepretation of the ROD. SVE intended only for Spectra Physics, the adjacent site.	Sean Hogan 415-744-2233 Carla Dube 510-286-1041

Note: The 6th edition report also adds information on 53 innovative treatment technologies selected for remedial actions in FY 1993 RODs.

Additions, Changes, and Deletions from the 5th edition report (September 1993) to the 6th edition report (September 1994). (continued)

Region	Site Name, State (ROD Date)	Technology Listed in 5th Edition	6th Edition			Comments	Contacts/Phone
			Added	Deleted	Changed to		
9	FMC (Fresno), CA (06/28/91)	Soil Washing		Yes		Soil washing did not work because the soil had too many fines. Looking at thermal desorption and solidification/ stabilization as possible remedies.	Tom Dunkelman 415-744-2287 Mike Pfister (CA) 209-297-3934
9	Signetics (Advanced Micro Devices 901), CA (09/11/91)	Soil Vapor Extraction		Yes		Combined ROD for Signetics, AMD 901/902 and TRW Microwave site. SVE is not being done at the TRW OU. Misinterpretation of ROD.	Darrin Swartz-Larson 415-744-2233 Kevin Graves (CA) 510-286-0435
9	Sacramento Army Depot, Oxidation Lagoons OU, CA (09/30/92)	Soil Washing		Yes		Technology canceled due to cost. Looking at solidification as an alternative.	Marlin Mezquita 415-744-2393 George Siller (USACE) 916-557-7418 Dan Oburn (Sacramento Army Depot) 916-388-4344
10	McChord AFB Washrack Treatment Area, AK (09/28/92)	Bioremediation (Ex Situ)		Yes		Additional studies showed treatment not needed.	Marie Jennings 206-553-1173

Note: The 6th edition report also adds information on 53 innovative treatment technologies selected for remedial actions in FY 1993 RODs.

Appendix E
Completed Innovative Projects and Treatment Trains

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TABLE E-1

REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS

Table E-1 provides summary information on the performance and operating parameters for applications of innovative treatment technologies that have been completed at remedial sites. It is intended to supplement, not replace, the information included in table A-1.

TABLE E-1
REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS

June 1994

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
1	Cannon Engineering/MA 5/90 to 10/90	Thermal desorption/ Canonie Environmental Services Corp., Porter, IN	Soil (11,300 tons)	TCE, DCE, PCE, BTEX, vinyl chloride, chlorobenzene, SVOCs Criteria: 0.1 ppm - TCE, DCE, PCE, chlorobenzene 0.2 ppm - Toluene, Total Xylenes 0.05 ppm - Vinyl chloride SVOCs - 3 ppm Benzene - 0.1 ppm Input 500 - 3,000 ppm (Total VOCs) Output - <0.025 ppm (Total VOCs)	Continuous operation 40 tons/hr 450 - 500° F Moisture content before treatment - 5% - 25% moisture Additives - dry soil (to reduce moisture content)	Excavation Screening Mixing Dewatering	Exhaust gas treated with baghouse, scrubber, and carbon adsorption Scrubber water was treated with carbon adsorption	The waste feed size limitation for the equipment, 1.875 inches, was an important consideration. More information is available in the RA report available from Region 1.
1	McKin, ME 7/86 to 4/87	Thermal desorption/ Canonie Env. Services Corp., Porter, IN	Soil (11,500 cy to a depth of 10 ft.)	BTEX, PAHs, TCE Criteria: 0.1 ppm TCE averaged over batch treatment volume 1.0 ppm per individual aromatic organic compound, and PAHs 10.0 ppm for total PAH constituents Input: Up to 3,310 ppm TCE Output: Less than 0.1 ppm TCE	Batch process: 8-9 cy/batch Residence time: 2 minutes/pass, 3 passes per batch 250-400°F soil exit temperature	Excavation Screening Mixing	Exhaust gas treated with baghouse, scrubber, and carbon adsorption Scrubber water was treated with carbon adsorption Residual solids deposited on-site. HEPA filters, baghouse bags, and PPE incinerated off-site	

Newly added or completed projects

TABLE E-1
REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1994

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
1	Ottati & Goss, NH 6/89 to 9/89	Thermal desorption/ Canonie Environmental Services Corp., Porter, IN	Soil (5,100 cy)	TCE, PCE, DCA, BTEX, TCA Criteria: 1 ppm - Total VOCs 0.1 ppm DCA, benzene, TCE, PCE Input: Up to 460 ppm TCE, 1200 ppm PCE Output: Less than 0.025 ppm TCE, PCE	Batch process 300-400° F soil exit temperature	Excavation Screening	Exhaust gas treated with baghouse, scrubber, and carbon adsorption Scrubber water treated with carbon adsorption Residual solids stabilized and redeposited on-site	For more information on this project, see the close out report available from Region 1.
2#	King of Prussia, NJ 6/93 - 10/93	Soil Washing using water and proprietary additive Alternative Remedial Technologies, Inc.	Soil, sludge, and sediments (19,200 tons)	Metals (Chromium, Copper, Nickel) Criteria: 11 metal-specific cleanup levels based on risk of exposure	Continuous process Feed rate: 25 tons/hr Addition of polymer and surfactants	Excavation Screening	Residual sludges disposed off-site as non-hazardous waste	X-ray fluorescene (XRF) used on-site for selective excavation
2#	SMS Instruments/ Deer Park, NY 4/92 to 12/93	Soil Vapor Extraction/ Four Seasons Environmental, Inc. Greensboro, NC	Soil (1,250 cy)	VOCs, SVOCs Criteria: Levels specified for nine VOCs and nine SVOCs, ranging from 500 to 4,500 µg/kg Input: >1,000 ppm total VOCs Output: All soil samples met criteria	Two horizontal vapor extraction wells Vacuum of 378-406 w.c. inches (absolute) Depth to groundwater: 16-24 feet	None (in situ)	Exhaust gases were treated with a catalytic incinerator and scubber	
2#	Waldick Aerospace Devices (OU 1), NJ 5/93 to 10/93	Low temperature thermal treatment Rust Remedial Services, Inc., SC	Soil (4,000 cy)	Criteria: Total VOCs: 1 ppm Total petroleum hydrocarbons: 100 ppm	20 tons/hr, 450 - 500°F	Screening	Vapors treated in secondary thermal treatment unit; off-site s/s of treated soils	First use of full-scale unit; actual design capacity of unit is approximately 35 tons/hr.

Newly added or completed projects

TABLE E-1
REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1994

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
2	Wide Beach Development, NY 9/90 to 9/91	Thermal desorption with APEG dechlorination/ SoilTech ATP Systems, Inc. Porter, IN	Soil (42,000 tons)	PCBs Criteria: Soils >10 ppm PCBs to be excavated and chemically treated 2 ppm PCBs established as remedial action contract cleanup level Input: 11-68 ppm PCBs Output: ≤2 ppm PCBs; one sample contained 21 ppm PCBs	Continuous process Preheat/retort zone residence time: 30-40 minutes Retort zone temperature: 1,160° F Combustion zone temperature: 1,293° F Additives: Alkaline polyethylene glycol (APEG)	Excavation Shredding, grinding Magnetic screening	Exhaust gas treated with cyclone, baghouse, acid gas scrubber, and activated carbon adsorption Treated solids were intended to be redeposited; however, they were determined to be unstable for backfilling	For further information on this dechlorination project, see the Demonstration Test Report produced by EPA, Region 2.
2	Upjohn Manufacturing Company, PR 1/83 to 3/88	Soil Vapor Extraction Terra Vac, Corp. Costa Mesa, CA	Soil (16,000 sq ft to approximately 100 ft deep) Approximately 17,800 gallons of CCl_4 was removed from the soil	Carbon tetrachloride (CCl_4) Criteria: 50 µg/liter CCl_4 (drinking water limit); calculated to correspond to "non-detectable" concentration of CCl_4 in exhaust gas for three consecutive months Input: Up to 2,200 ppm CCl_4 (initial concentration) Output: Less than 2 ppb (final concentration)	19 vacuum extraction wells Depth of primary extraction well: 75 feet Operational inlet vacuum: 12 inches Hg	None	Discharge of soil vapors through 30-ft stack No other off-gas treatment	For further information on this application, see the Applications Analysis Report for the Terra Vac In situ Vacuum Extraction System (EPA/540/A5-89/003).
3#	Defense General Supply Center, OU5, VA December 1-11, 1992	Soil Vapor Extraction Engineering-Science	Soil (1,000 cy)	VOCs (PCE, TCE)	In situ using one extraction well			Pilot study conducted 12/1/92 - 12/11/92 Soil samples revealed the soil showed no further contamination

TABLE E-1
REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1994

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
4	Brown Wood Preserving, FL 10/88 to 12/91	Land treatment/ Remediation Technologies, Inc. Seattle, Washington	Soil/pond sediment (7,500 cy)	PAHs, defined in terms of total carcinogenic indicator chemicals (TCICs) Criteria: 100 ppm TCICs sampled on 8 subplots Input: Up to 208 ppm TCICs Output: Less than 92 ppm TCICs	Soil treated in 3 lifts Retention time: 4 to 15 months Additives: water and nutrients Mixing rate: tilled once every two weeks	Site preparation (land clearing) Excavation Screening Tilling	Treated material vegetated with grass (no cap) Retention pond constructed for runoff	Further information on this project is available from the Remedial Action Close Out Report.
4	Hollingsworth Solderless, FL 1/91 to 7/91	Soil vapor extraction EBASCO (ARCS contractor)	Soil 60 cy (down to 7 feet deep)	TCE, vinyl chloride Target: total VOCs 1 ppm	In situ	None required	Air emissions vented to atmosphere	Design specifications were very critical. Need to pay close attention to design specifications
4#	Wamchem, SC During 8/93	Thermal desorption Four Seasons Greensboro, NC	Soil (2,200 cy)	Criteria: Acetone - 97 ppm Benzene - 2.43 ppm 1,2-Dichlorobenzene- - 33.43 ppm 1,4-Dichlorobenzene- - 38.06 ppm 2,4-Dinitrotoluene - 3.62 ppm Naphthalene - 74.6 ppm Toluene - 34.5 ppm 1,2,4-Trichlorobenzene - 4.23 ppm Total Xylenes - 67.6 ppm	Continuous feed 5-7 tons/hr		Catalytic oxidation of off-gas	

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
5#	Ninth Avenue Dump, IN 2/92 to 3/94	In situ Flushing Fluor Daniel Chicago, IL	Soil (64,000 cy)	VOCs (TCE, BTEX) PAHs Pumped until no more oil recovered Inside slurry wall treated water 90% reduction in COD	14 extraction wells, unknown number of trenches 6,300 gallons of oil recovered		Recovered oil sent off-site for incineration, water recovered sent through oil/water separator, iron removal, and biological treatment prior to reinjection	
5	Seymour Recycling, IN Summer - 1990 August-October, 1986 January-February, 1987	In situ soil bioremediation ABB Environmental Services	Soil (12 acres to 10 ft deep, approximately 43,500 cy)	54 contaminants present, including TCE, TCA, and Carbon Tetrachloride No standards or criteria for this OU in ROD	Additives - nitrogen, phosphorus, potassium, sulfur as fertilizer (200,000 gallons of nutrients added)	Tilling	Capping in place	The soil became saturated quickly during this project, creating surface pools. The specially-designed tractor got stuck.
5	Outboard Marine Corp./Waukegan Harbor (OU #3), IL 1/92 to 7/92	Thermal Desorption SoilTech ATP Systems, Inc. Porter, IN	Soil/Sediments (12,800 tons)	PCBs Criteria: 97% removal of PCBs Initial: 23,000 ppm PCBs Final: Achieved >97% removal, <9 ppm PCBs in treated soil	Continuous process Residence time: 15 minutes Throughput: 8 tons/hr Preheat zone temperature: 850° F Retort zone temperature: 1200°F Combustion zone temperature: 1300° F	Excavation Mixing Dewatering	Exhaust gas treated with cyclone, baghouse, acid gas scrubber, and activated carbon adsorption Condensed water discharged to sanitary sewer after triple filtration, UV oxidation, and carbon adsorption	Reduced PCB levels much more than expected.

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
5#	Anderson Development (ROD Amendment), MI 11/92 to 6/93	Thermal desorption Weston Services, Inc.	Soil (5,100 tons)	SVOCs (MBOCA) Input: 660 ppm (maximum) MBOCA Criteria: 1.684 ppm MBOCA Output: <1.684 ppm MBOCA Greater than 99% removal	Continuous with a retention time of 1 hour and throughput of 50-60 tons per day. Temperature 500 - 600°F. Moisture content 40-50% Most of waste was treated twice because 1 hour retention time was not enough.	Excavation screening dewatering Stockpiling	Wastewater discharged to treatment facility. Treated soils and fly ash sent to Type II Landfill. Carbon sent to RCRA disposal facility	Site reports available.
5	Verona Well Field (Thomas Solvent/Raymond Road) (OU1), MI 3/88 to 5/92	Soil vapor extraction (attempted nitrogen sparging) Terra Vac, Inc. Costa Mesa, CA	Soil (26,700 cy, 36,000 ft^2 to a depth of 20 ft.)	Initial soil concentration TCE 550,000 ppb; PCE 1.8 million ppb; Toluene 730,000 ppb; Xylene 420,000 ppb Criteria in all post remedial soil samples; Total Xylenes 6,000 ppb; Toluene 16,000 ppb; Benzene 20 ppb; Ethylbenzene 14,000 ppb; 1,1- DCE 10 ppb; trans-1,2-DCE 2,000 ppb; 1,1,1-TCA 4,000 ppb; Carbon tet., 10 ppb; 1,2-DCA 10 ppb; 1,1-DCA 20 ppb; Methylene chloride 100 ppb; cis-1,2 DCE 20 ppb; PCE 10 ppb; TCE 60 ppb	1,400-1,600 cu ft/ min of air Started >1,000 lbs/day removed Total removed 45,000 lbs of VOCs 23 extraction wells	No materials handling; required installing extraction wells Vapors initially treated with carbon; then with CATOX; and then returned to carbon	Spent carbon was regenerated (and eventually incinerated)	Initial estimate of product too low. Treatment equipment undersized. Needed better quantification of VOCs in soils to design appropriate size. Plan for enhancing system to deal with saturated soils and free product. Public information available includes performance report, and technical memo.

TABLE E-1
REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1994

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
5#	Pristine, OH 9/93 to 3/94	Thermal desorption	Soil (19,400 cy)	Criteria: aldrin - 15 µg/kg benzene - 116 µg/kg chloroform - 2,043 µg/kg DDT - 487 µg/kg 1,2-DCA - 19 µg/kg 1,1-DCE - 285 µg/kg dieldrin - 6 µg/kg PAHs - 14 µg/kg dioxin - 0 µg/kg PCE - 3,244 µg/kg TCE - 175 µg/kg				
6#	French Ltd. Crosby, TX 1/92 to 12/93	Bioremediation (slurry phase) ENSR Houston, TX	Soil/sludge (150,000 cy)	Volatile organic compounds; PCBs; phenols, heavy metals Cleanup Goals: Benzo(a)pyrene - 9 ppm PCB - 23 ppm Volatile organic compounds - 43 ppm Arsenic - 7 ppm Benzene - 14 ppm	In situ treatment	Air sparging Pumping Dredging	In situ treatment	First use of bioremediation technology at a Superfund site Cleanup of contaminated groundwater to be completed in 1996
7#	Hastings GW Contamination, Well No. 3, NE 6/92 to 7/93	Soil vapor extraction Morrison Knudsen	Soil 1 acre down to 120 feet deep (approximately 194,000 cy)	Carbon tetrachloride Initial: 100 ppm Final: <0.2 ppm Target removal rate achieved was 0.001 lb/hr, removed in excess of 500 lbs	In situ cyclic operation, operated for a total of 4,325 hours	Vapors treated with granular activated carbon (GAC)	Carbon sent off-site for regeneration	Soil Vapor extraction system exceeded predictions by the model due to sand and gravel present at the site. Cleanup occurred much quicker than predicted by the model.
8	Rocky Mountain Arsenal (OU 18) Interim Response, CO 6/91 to 12/91	Soil vapor extraction Vapor phase carbon adsorption to capture vapors Woodward Clyde Denver, CO	Soil (100 ft radius down to 60 ft; approximately 70,000 cy)	TCE Initial extracted gas concentration 60 ppm Final extracted gas concentration 2 to 3 ppm	145-335 cu. ft./min. of air Total removed 70 lbs. 2 extraction wells	No materials handling; required installing extraction wells	Vapors captured on carbon	Sampling indicated the presence of TCE mainly in the soil gas samples and not the soil samples

TABLE E-1
REMEDIAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1994

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
8#	Wastech Chemical, UT 10/92 to 12/92	Bioremediation (Ex situ) Land treatment on an asphalt pad Harding/Lawson	Soil (1,100 cy)	VOCs (Toluene, Xylene)	Tilled, addition of nutrients and water		Soil redeposited on site	Air emission standards not exceeded
9	Fairchild Semiconductor (San Jose), CA 1/89 to 6/90	Soil vapor extraction, in situ flushing with treated groundwater	Soil (42,000 cy)	TCA, DCE, IPA, xylenes, acetone, Freon-113, PCE ROD originally stated cleanup target of 1 ppm Amended cleanup goals required SVE operation until VOC removal rate was ≤10% of initial rate, or VOC removal rate was <1% per day for 10 consecutive days	39 extraction wells; 28-144 scfm air flow rate; 15 inches of Hg operating vacuum	None	In situ treatment; carbon adsorption of off-gases	Groundwater pump and treat was conducted in conjunction with SVE; slurry wall was constructed to limit contaminant migration
9#	Intersil/Siemens, CA Intersil portion of the site completed Fall 93	Soil Vapor Extraction Geo-Matrix, San Francisco, CA	Soil	VOCs (TCE 1,1,1-TCA, XyLene)				

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
9	Sacramento Army Depot Tank 2 Operable Unit, CA 8/92 to 1/93	In-situ soil vapor extraction, extracted vapor treated with gas phase carbon adsorption, water treatment by the existing on-site UV-hydrogen peroxide treatment plant/Terra Vac, Inc. San Leandro, CA	Soil (1,000 cy, 25 by 35 ft., 31 ft. depth)	VOCs (Ethylbenzene, PCE, MEK Total Xylenes) Initial concentration: MEK 0.011 - 150 mg/kg Ethylbenzene 0.006 - 2,100 mg/kg PCE 0.006 - 390 mg/kg Total Xylene 0.005 - 11,000 mg/kg Clean up goal 1.2 mg/kg MEK 6 mg/kg Ethylbenzene 23 mg/kg total Xylene 0.2 mg/kg PCE 100 mg/kg total hydrocarbons	24 hours/day Air flow rate: 16-365 scfm	None	Extracted vapor treated with gas phase carbon adsorption water treatment by the existing on-site UV-hydrogen peroxide treatment plant	Freon - 113 unexpectedly extracted by system - impacted system operation

TABLE E-2

REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS

Table E-2 provides summary information on the performance and operating parameters for applications of innovative treatment technologies that have been completed at removal sites. It is intended to supplement, not replace, the information included in table B-2.

TABLE E-2
REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS

June 1994

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
2	Signo Trading International, Inc., NY 10/20/87 to 10/21/87 (Removal)	KPEG dechlorination/ Galson Remediation, Syracuse, NY	Sludge (15 gallons)	Dioxin Input - 135 ppb Output - 1 ppb	Temperature: 150°C Time: Overnight	None	Incineration of residuals (without dioxin contamination) at treatment, storage, and disposal facility	
2	Vineland Chemical Company, NJ 12/92 (Removal)	Mercury pretreatment precipiated mercury salts into mercury sulfide so that the mercury can be recovered and recycled. ENSCO	Solid 100 lbs	Mercury initial concentration >10% mercury Final concentration of mercury in recyclable precipitate was greater than 80%. Less than 260 ppm if mercury in thatn nonrecycled salt.	Added salt to precipitate the mercury	None	Residual salts containing less than 260 pm mercury were incinerated off-site	First known Superfund site where this process has been applied
2	Zhiegner Refining Company (Removal) 2/93 - 6/93	Mercury pretreatment precipiated mercury salts into mercury sulfide so that the mercury can be recovered and recycled. ENSCO	Solid 100 lbs	Mercury initial concentration >10% mercury Final concentration of mercury in recyclable precipitate was greater than 80%. Less than 260 ppm if mercury in thatn nonrecycled salt.	Added salt to precipitate the mercury	None	Residual salts containing less than 260 pm mercury were incinerated off-site	No comments

Newly added or completed projects

TABLE E-2
REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1994

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
3	Avtex Fibers, VA 4/90 to 8/91 (Removal)	Chemical treatment (oxidation using NaClO) OH Materials, Findlay, OH (ERCS Contractor)	Sludge/water from storage unit (2 million gallons)	Carbon disulfide Criteria: ≤10 ppm - Carbon disulfide in the effluent Input: 50-200,000 ppm Carbon disulfide Output: ≤10 ppm Carbon disulfide	Batch operation average retention time - 1 hour pH - 10 Additives: Sodium hypochloride. The retention time and reagent feed rates increased with increasing concentration of sludge in the contaminated water.	Pumping	Salts from the reaction were removed with flocculation and clarification at existing treatment plant, pH adjustment	Carbon disulfide is unstable and will be found with other contaminants in aqueous waste stream. For additional information on this project, see the Removal Close Out Report available from EPA - Region III or OH Materials.
4	General Refining Company, GA August-October, 1986 January-February, 1987 (Removal)	Solvent extraction Resource Conservation Technology Company, Bellevue, WA	Sludge (3,448 tons)	Input: PCB - 5.0 ppm Lead - 10,000 ppm Output: PCB - insignificant Lead - concentrated in solids	Continuous operation Time: 2 hours pH: 10 Temp: 20°C Rate: 27 tons/day Moisture content - 60% Additives: Sodium hydroxide Triethylamine	Excavation Screening Neutralization Size Reduction Mixing	Oil - used as fuel for kiln Water - treated, discharged off site Solids - solidified and disposed of on site	The oil recovered from the extractions process could not be sold because of an elevated metals content. The solvent could not be recovered due to leaks in system seals. The unit required a relatively uniform material so materials handling of the sludges proved difficult in the beginning of the project. The lead-bearing solids produced by the dryer also required special handling. Finally, detergents in the sludge hindered oil/water separation.

Newly added or completed projects

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
4	Hinson Chemical, SC 12/88 to 3/92 (Removal)	Soil vapor extraction OH Materials Atlanta, GA	Soil (60,000 cy, up to 50 ft deep)	Benzene, TCE, PCE, DCA, MEK At completion: <10 ppm Total VOCs (In all samples); average <1 ppm Total VOCs	In situ; continuous operation (except for occasional shut downs to allow soil gas to reach equilibrium in the pore spaces)		Air emissions captured on vapor phase carbon No cap needed	
4	CSX McCormick Derailment Site, S.C. (Removal)	Soil vapor extraction with air flushing MWRI	Soil (200,000 cy)	Benzene-toluene-ethylbenzene-xylene (BTEX) 130,000 gallon spill	Used a system of extraction and injection wells. 1,000 separate PVC wells. Injection wells 7 to 8 feet deep. Extraction wells 2-3 feet deep. Vapors captured and put through a knock out pot and incinerated.	Brought in clay to cover the area, to prevent air from infiltrating	Residual wastewater sent off-site for treatment	System was successful in decreasing concentration to cleanup goals. Had difficulties due to fluctuation of shallow ground water. Did not anticipate the change in ground water to be as drastic as it was. It decreased the efficiency, less vapors and more water. Now need to address ground water. Could have used the soil vapor extraction in a more limited area.

Newly added or completed projects

TABLE E-2
REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1994

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
4	Basket Creek Surface Impoundment, GA 11/92 - 2/93 (Removal)	Vacuum extraction of soil pile with horizontal wells (ex-situ) OHM	Soil (2,000 cy)	VOCs TCE, PCE, MEK, MIBK, BTEX High 33% VOCs Average 1-5% Criteria: TCE - 0.5 mg/L TCLP PCE - 0.7 mg/L TCLP All VOCs met TCLP limits	Vacuum pressure monitored. 1,300 CFM/Manifold 3 manifold 6-7 wells/manifold	Surface impoundment used for disposal of waste solvents. Built an enclosure over the site. Excavated the soil and screened it with a power screen. Stacked on PVC extraction wells. Recovered VOCs with duct work and fan. Vapors incinerated.	Residual soils and rejects from screening met TCLP limits and were disposed as nonhazardous as on RCRA Subtitle D landfill. Incinerated 70,000 lbs of VOCs	$2,000,000 total costs. Permeability in-situ soil was not good at first. Excavation and ex-situ treatment improved permeability. Shouldn't rule out if you can't do in situ.
4#	TH Agriculture and Nutrition Albany, GA	Thermal desorption/ Focus and Williams Environmental Services, Inc.	Soil (4,318 tons)	Pesticides Criteria: Reduction of 90% in concentration of alpha and beta BHC; 4,4'-DDT; and toxaphene Less than 100 mg/kg total OCL pesticides in treated soil	Continuous operation 7.8 tons/hr 250 - 510° F exit gas temperature 15 minutes residence time	Excavation Screening	Soils: quenched Off-gasses: baghouse, water quench, reheaters, and carbon adsorption water: carbon adsorption	
5#	Parson Chemical, MI	In situ vitrification	Soil (3,000 cy)					Confirmatory sampling to occur after melt cools (approximately Summer 1995)

Newly added or completed projects

TABLE E-2
REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1994

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
5	PBM Enterprises, MI 3/25/85 to 10/28/85 (Removal)	Neutralization with hypochlorite process Mid-American Environmental Service, Riverdale, IL	Film chips (464 tons or 1,280 cy)	Cyanide Input: 200 ppm Output: 20 ppm	Time: 2-3 hours Additives: sodium hydroxide	Agitation	Rinse water, runoff and waste hypochlorite - treated off site Treated chips - landfilled (Subtitle D)	
6	Traband Warehouse PCBs, OK (Removal) 2/90 to 9/90	Solvent Extraction/ Terra Kleen	Solids	PCBs Initial: 7,500 ppm				
7	Crown Plating, MO 10/1/89 to 12/31/89 (Removal)	Dechlorination using the KPEG process EPA removal contractor	Liquid (5 gallons)	Criteria: Dioxin - <1 ppb Input: Silvex - 10,000 ppm Dioxin equivalents - 24.18 ppb Output: Silvex - 32 ppb Dioxin equivalents - 0.068 ppb	Batch operation Retention time - 36 hours (including time of equipment breakdown) Temperature - 72°C pH - 13 Moisture content - 100%		Built an on-site vacuum for emissions control Contaminated residual oil incinerated off-site	
7	Scott Lumber, MO 12/89 to 9/91 (Removal)	Land Treatment RETEC Billings, MT	Soil (15,961 tons)	Input: 1500 - 1000 ppm - Total PAH 23 ppm - Benzo(a)pyrene Criteria: 500 ppm - Total PAH 14 ppm - Benzo(a)pyrene Output: 130 ppm Total PAH 8 ppm - Benzo(a)pyrene	Additives: Water phosphates Soil treated in 2 lifts 1st lift - 9 inches 2nd lift - 7 inches Cultivated approximately 1 to 2 times per week	Tilling Removal of rocks and debris	None	

Newly added or completed projects

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
9	Gila River Indian Reservation, AZ 3/28/85 to 6/24/85 (Removal)	In situ chemical treatment (followed by anaerobic bio-remediation) EPA removal contractor	Soil (3,220 cy)	Input: Toxaphene - 1,470 ppm Ethyl parathion - 86 ppm Methyl parathion - 24 ppm Output: Toxaphene - 470 ppm Ethyl parathion - 56 ppm Methyl parathion - 3 ppm	pH: 10.2 to 11.8 Moisture: wet Additives to soil: Sodium hydroxide, Water		Bioremediation	
9	Gila River Indian Reservation, AZ 6/24/85 to 10/23/85 (Removal)	In situ anaerobic biological treatment (preceded by chemical treatment) EPA removal contractor	Soil (3,220 cy)	Toxaphene Input: 470 ppm Output: 180 ppm	pH: 8.3 to 9.8 Additives to soil: Sulfuric acid, manure, sludge	Tilling	Capped in place	The biological treatment would have been more successful if the neutralization after the chemical treatment had been more complete. The tearing of the plastic sheets covering the soils allowed air in and prevented anaerobic activity.
9	Roseville Drums, CA 2/12/88 to 11/9/88 (Removal)	In situ Bioremediation EPA removal contractor	Soil (14 cy)	Input: Dichlorobenzene - 4,000 ppm Phenol - 12,000 ppm Output: Dichlorobenzene - 140 ppm Phenol - 6 ppm	Additives to soil: manure, water	Tilling		

Newly added or completed projects

TABLE E-2
REMOVAL ACTIONS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1994

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
9	Stanford Pesticide Site #1, AZ 3/20/87 to 11/4/87 (Removal)	Chemical treatment - alkaline hydrolysis EPA removal contractor	Soil (200 cy)	Methyl parathion Input: 24.2 ppm Output: 0.05 ppm	pH: 9.0 Moisture: wet Additives to soil: soda ash, water, activated carbon	Tilling (in situ, 3 times per week)		
9	Poly-Carb, Inc., NV 7/22/87 to 8/16/88 (Removal)	Land treatment and soil washing EPA removal contractor	Soil (1,500 cy)	Input: Phenol 1,020 ppm o-cresol - 100 ppm m- and p-cresol - 409 ppm Output: Phenol - 1 ppm o-cresol - 1 ppm m- and p-Cresol - 0.92 ppm	Additives: water	Excavation Placement in double-lined pit Irrigation Tilling	Leachate collection and treatment with granular activated carbon	This treatment used both bioremediation and soil flushing in one step.
10	Drexler-RAMCOR, WA 7/92 to 8/92 (removal)	Low temperature thermal desorption treatment. Thermally treat 3,000 tons of soil on-site up to 700°F. Four Seasons	Soil 3,000 tons (approximately 3,000 cy)	Petroleum hydrocarbons Polynuclear Aromatics, BTEX (Benzene, Toluene, Ethylbenzene, Xylene 200 ppm TPH was target. Initial TPH was 70,000 ppm - (high) 15,000 - 20,000 ppm (average). Treated soil TPH was 100 - 200 ppm	16 hours/day 12 to 15 tons/hr Operating temperature up to 700°F Vapors treated by catalytic oxidation	Excavation screening Removed material greater than 2 inches. Rock washing station for particles greater than 2 inches. Steam cleaned large rocks. Added water after treatment for dust suppression	Treated soil was backfilled back into the excavated areas on-site. Soil that did not meet the targets was re-treated. Wastewater was treated on-site through carbon filters.	Total cost approximately $250,000.

Newly added or completed projects

TABLE E-3

OTHER FEDERAL PROGRAMS: PERFORMANCE DATA ON COMPLETED PROJECTS

Table E-3 provides summary information on the performance and operating parameters for applications of innovative treatment technologies that have been completed at non-Superfund sites. It is intended to supplement, not replace the information included in table C-1.

TABLE E-3
OTHER FEDERAL PROGRAMS: PERFORMANCE DATA ON COMPLETED PROJECTS

June 1993

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
5	Saginaw Bay Confined Disposal Facility, MI October 1991 to June 4, 1992 (Army)	Soil washing; Water with flocculant and surfactant as an additive Bermann USA Stafford Springs, CT	Sediment (150 cy)	PCBs Input Sediment = 1.6 mg/kg Output Sand = 0.20 mg/kg Output Organics = 11 mg/kg Output Fines = 4.4 mg/kg	30 cy of sediment treated per day	Dredging Screening Size Reduction	Residuals were left at the facility Wastewater discharged to confined disposal facility	Forced cold-weather shut down is a limitation
6 #	Matagorda Island Af Range, TX 10/92 to 2/28/93	Ex situ bioremdiation; solid phase All constructed on abandoned runway. Bacteria added and mechanically mixed. Four USTs found contamination under one UST. CCC, Inc. San Antonio, TX	Soil (500 cy)	TPH, PAHs benzene-toluene-ethylbenzene-xylene (BTEX) TPH - 3,400 ppm BTEX - 41.3 ppm Criteria: Texas water commission standards 100 ppm for TPH 30 ppm for combined BTEX	Batch process Retention time: 3 months 9 inch layers treated. Ambient temperature bacterial added to waste	Excavated approximately 40 by 60 ft area. Constructed on poly barrier and clean sand base. Did some mixing.	Backfilled the soil into the excavation	Island is now a wildlife refuge, has an endangered species.
9	Ft. Ord Marina, Fritzche AAF Fire Drill Area, CA Winter 1991 (Army)	Land farming	Soil (4,000 cy)	TCE, MEK, TPH, BTEX	Initial concentration > 1,000 ppm End concentration < 200 ppm	None	None	Gail Youngblood 408-242-8017
9	Marine Corps. Mountain Warfare Center Bridgeport, CA 8/89 to 11/89 (Navy)	Bioremediation (ex situ); heap pile bioreactor	Soil (7,000 cy)	PAHs (petroleum hydrocarbons, diesel), Metals (Lead) After 2 months of operation the TPH levels were 120 ppm		Excavation		Temperature, pressure and moisture content are monitored Bill Major (DoD) 805-982-1808

Newly added or completed projects

TABLE 3-4
OTHER FEDERAL PROGRAMS: PERFORMANCE DATA ON COMPLETED PROJECTS (continued)

June 1993

Region	Site Name, State, Dates of Operation	Technology/ Vendor	Media Treated (Quantity)	Key Contaminants Treated	Operating Parameters	Materials Handling Required	Residuals Management	Comments
9#	Luke AFB, AZ 11/92 to 5/9	Soil vapor extraction with air flushing and thermal oxidation of off-gases Jacobs Engineering	Soil (35,000 cy)	VOCs (2-hexanone, 2-butanone, 4-methyl 2 pentanone, BTEX) Removed approximately 11,000 lbs of vapors and 4,000 lbs of condensate	In situ down to 100 feet	None	Vaports were thermally oxidized	Total petroleum hydrocarbons were present but were too heavy to volatilize. Would recommend combining SVE with in situ bioremediation to treat contaminants that could not be extracted with the SVE.
9	Davis Monthan AFB, AZ July 1991 to March 1992	Bioremediation (In situ soil)	Soil (440 cy)	PAHs (Petroleum Hydrocarbones)				
	Naval Communication Station, Scotland February to October 1985 (Navy)	Bioremediation In situ soil, in situ ground water	Soil, Groundwater Soil quantity approximately 800 m^2 in area, depth unknown	TPH (No. 2 diesel fuel)	Microorganisms function best between 20°C and 35°C.	Run-off water collected in a trench	None	The contaminated area had considerable slope, and the contaminated soil was a thin layer over a relatively impermeable rock substrate.

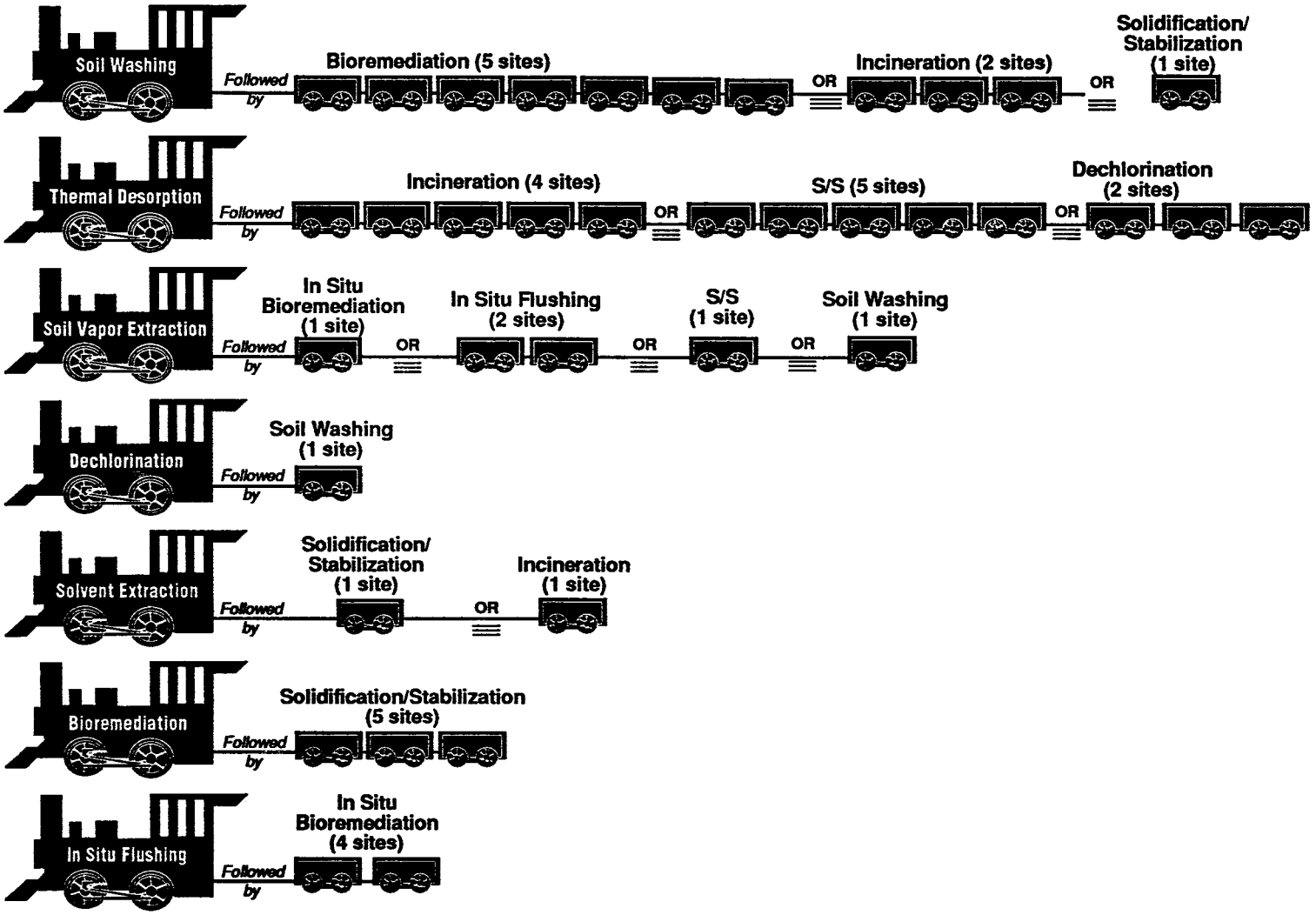
Newly added or completed projects

TABLE E-4

REMEDIAL ACTIONS: TREATMENT TRAINS WITH INNOVATIVE TREATMENT TECHNOLOGIES

Table E-4 lists the sites at which innovative treatment technologies are used together with established or other innovative treatment technologies in treatment "trains." Technologies may be combined to reduce the volume of material requiring further treatment, to prevent the emission of volatile contaminants during excavation and mixing, or to address multiple contaminants in a single medium.

FIGURE E-1
***SUPERFUND REMEDIAL ACTIONS:* TREATMENT TRAINS WITH INNOVATIVE TREATMENT TECHNOLOGIES**
TOTAL TREATMENT TRAINS = 38



Dechlorination Followed by

Soil Washing	Myers Property	NJ

Ex Situ Bioremediation Followed by

Solidification/Stabilization	Whitmoyer Laboratories, OU 3	PA
Solidification/Stabilization	J. H. Baxter	CA
Solidification/Stabilization	Cape Fear Wood Preserving	NC
Solidification/Stabilization	Oklahoma Refining Co.	OK
Solidification/Stabilization	PAB Oil	LA

In Situ Flushing Followed by

In Situ Bioremediation	Peak Oil/Bay Drums, OU	FL
In Situ Bioremediation	Pester Burn Pond	KS
In Situ Bioremediation	Idaho Pole Company	MT
In Situ Bioremediation	Montana Pole Company	MT

Soil Vapor Extraction Followed by

In Situ Bioremediation	Swope Oil & Chemical Co.	NJ
In Situ Flushing	JADCO - Hughes	NC
In Situ Flushing	Pasley Solvents and Chemicals, Inc.	NY
Solidification/Stabilization	Genzale Plating Company, OU 1	NY
Soil Washing	Zanesville Well Field	OH

Soil Washing Followed by

Bioremediation	Cabot Carbon/Koppers	FL
Bioremediation	Whitehouse Waste Oil Pits	FL
Bioremediation	Cape Fear Wood Preserving	NC
Bioremediation	Moss-American	WI
Bioremediation	Koppers (Oroville)	CA

Soil Washing Followed by (continued)

Incineration	Arkwood	AR
Incineration	South Cavalcade Street	TX
Solidification/Stabilization	Gould, Inc	OR

Solvent Extraction Followed by

Incineration	United Cresoting	TX
Solidification/Stabilization	O'Connor	ME

Thermal Desorption Followed by

Dechlorination	Arlington Blending & Packaging Co., OU 1	TN
Dechlorination	Smith's Farm Brooks, OU 1	KY
Incineration of Organic Vapors	Sarney Farm	NY
Incineration of Organic Vapors	Outboard Marine/Waukegan Harbor	IL
Incineration of Organic Vapors	Carter Industries	MI
Incineration of Organic Vapors	Martin Marietta (Denver Aerospace)	CO
Solidification/Stabilization	Waldick Aerospace Devices	NJ
Solidification/Stabilization	USA Letterkenny (SE Area, OU 1)	PA
Solidification/Stabilization	Acme Solvent Reclaiming, Inc., OU 2	IL
Solidification/Stabilization	Carter Industries	MI
Solidification/Stabilization	Martin Marietta (Denver Aerospace)	CO

TABLE E-5

REMOVAL ACTIONS: TREATMENT TRAINS WITH INNOVATIVE TREATMENT TECHNOLOGIES

Table E-5 lists the at which innovative treatment technologies are used together with established or other innovative treatment technologies in treatment "trains." Technologies may be combined to reduce the volume of material requiring further treatment, to prevent the emission of volatile contaminants during excavation and mixing, or to address multiple contaminants in a single medium.

Chemical Treatment Followed by		
In Situ Bioremediation	Gila River Indian Reservation	AZ
In Situ Flushing Followed by		
In Situ Bioremediation	Polycarb	NV
Soil Washing Followed by		
Bioremediation	Southeastern Wood Preserving	MS
Solvent Extraction Followed by		
Solidification/Stabilization	General Refining	GA